



**Upnest - Skill enhancement platform**

**ON**

Submitted in partial fulfilment of the requirements of  
the degree of

**Bachelor of Engineering  
(Information Technology)**

By

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Under the guidance of

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Mumbai 400074**

**(An Autonomous Institute, Affiliated to University of Mumbai)**

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# Vivekanand Education Society's Institute of Technology

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## *Certificate*

This is to certify that project entitled

**Upnest**

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## *Declaration*

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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## **Abstract**

UpNest is a full-stack web application developed using ReactJS, Tailwind CSS, Flask, and MongoDB, designed to enhance users' learning journeys through personalized skill recommendations and real-time hackathon discovery. The frontend utilizes ReactJS for dynamic UI rendering and Tailwind CSS for a modern, responsive interface. The Flask-powered backend manages secure OTP-based user authentication, course recommendations, and chatbot interactions using RESTful APIs. MongoDB stores user data, selected courses, and skill profiles efficiently, enabling seamless tracking and updates. Users can explore curated course listings based on their skills, save them to a personal dashboard, and access ongoing hackathons with direct registration links. Additionally, an AI-integrated chatbot powered by Gemini assists users with learning queries. UpNest delivers a scalable and engaging solution for learners seeking skill growth, event participation, and self-paced exploration.

Dept. of Information Technology

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# Chapter 1

## 1.1 Introduction

UpNest is a full-stack web application developed using ReactJS, Tailwind CSS, Flask, and MongoDB. It is designed to assist learners in enhancing their skills through personalized course recommendations and access to live hackathon opportunities. The platform provides an intuitive interface for users to explore trending skills, save preferred courses, and receive real-time AI support via a chatbot. With a smooth and responsive frontend and a robust backend, UpNest ensures secure authentication, efficient data handling, and a dynamic user experience tailored for continuous growth and learning.

## 1.2 Objectives

- To build a responsive platform that recommends relevant skills and courses based on user input.
- To implement secure OTP-based user authentication and profile management.
- To allow users to explore and save useful courses under a personalized "My Courses" section.
- To provide real-time hackathon discovery with direct access to official registration pages.
- To integrate an AI-powered chatbot for resolving user queries and enhancing self-learning.

## 1.3 Motivation

Learners often struggle to find direction in upskilling and identifying relevant learning resources. The motivation behind UpNest is to simplify this journey by offering personalized skill-based course suggestions and exposing users to active hackathons for real-world participation. Most existing platforms are either static or limited in user-centric features. UpNest fills this gap by integrating smart course discovery, event engagement, and a helpful AI chatbot—all in one place. This encourages continuous learning and participation while making the process seamless and motivating.

## 1.4 Scope of the Work

The scope of **UpNest** involves building a web-based skill enhancement platform that helps users discover relevant learning paths. It offers skill-based course recommendations, curated course listings, live hackathon discovery, and an AI chatbot for instant support.

**Key functionalities in scope include:**

- **User Authentication:** OTP-based secure registration and login.
- **Skill-Based Course Suggestions:** Recommendations based on user-selected skills.
- **Course Exploration & My Courses:** Users can browse through various skill domains and save preferred courses to a personalized "My Courses" list.
- **Hackathon Discovery:** Find and access real-time hackathon events.
- **AI Chatbot:** Gemini-powered chatbot for resolving user doubts.

## 1.5 Feasibility Study

### Technical Feasibility

The project is highly feasible with the chosen technology stack:

- **Frontend:** Built with **ReactJS** and **Tailwind CSS**, ensuring a dynamic, responsive, and visually consistent user interface.
- **Backend:** Developed using **Flask**, a lightweight Python web framework ideal for building RESTful APIs and handling logic like OTP verification, user authentication, and chatbot communication.
- **Database:** Utilizes **MongoDB Atlas**, a flexible NoSQL cloud database, for storing user profiles, course selections, and personalized data.
- **Deployment:** Can be deployed on platforms like **Render**, **Vercel**, or **Heroku** with support for continuous integration and auto-deployment.

### Operational Feasibility

UpNest is designed to offer a seamless and intuitive experience. The user interface is minimalistic and clean, enabling even non-technical users to navigate easily. With real-time skill recommendations, hackathon access, chatbot support, and interactive course tracking, the application is operable and user-friendly in real-world educational contexts.

# Literature Survey

## 2.1. Introduction

In the digital age, learners often face challenges in identifying suitable learning paths and accessing real-time opportunities for skill enhancement. Traditional methods, such as browsing multiple platforms or relying on word-of-mouth, can be time-consuming and inefficient. UpNest addresses these challenges by offering a centralized platform that provides personalized course recommendations, real-time hackathon listings, and an AI-powered chatbot for instant support. By integrating modern web technologies, UpNest simplifies the learning journey, making it more accessible and engaging for users.

## 2.2. Problem Definition

Despite the proliferation of online learning resources, learners encounter several obstacles:

- **Fragmented Resources:** Difficulty in finding consolidated platforms that offer both learning materials and real-time opportunities like hackathons.
- **Lack of Personalization:** Generic course recommendations that do not align with individual skill levels or interests.
- **Limited Real-Time Support:** Absence of immediate assistance or guidance during the learning process.
- **Inefficient Discovery Mechanisms:** Challenges in navigating through vast amounts of content without effective filtering or recommendation systems.

UpNest aims to overcome these issues by providing:

- **Personalized Course Recommendations:** Tailored suggestions based on user-selected skills and interests.
- **Real-Time Hackathon Listings:** Up-to-date information on ongoing and upcoming hackathons, enabling users to apply their skills in practical scenarios.
- **AI-Powered Chatbot Support:** Instant assistance for user queries, enhancing the learning experience.
- **User-Friendly Interface:** An intuitive design that facilitates easy navigation and engagement.

## **2.3. Review of Literature Survey**

- 1. R. Sharma & S. Kumar (2022). "A Review on E-Learning and Skill Enhancement Platforms", International Journal of Computer Applications, Vol. 184, No. 45, pp. 22-28.**

This paper explores the evolution and effectiveness of digital platforms designed for skill development and enhancement. The authors analyze various systems like Coursera, Udemy, and Khan Academy, emphasizing their adaptability in providing personalized, self-paced learning environments. The study highlights how modern platforms leverage user-provided data (e.g., interests and prior knowledge) to recommend courses and track progress, making learning more engaging and tailored to individual needs. The research concludes that integrated recommendation systems, user dashboards, and practical application opportunities (like projects or hackathons) are essential components of successful skill enhancement platforms.

- 2. Labadze, L., Grigolia, M., & Machaidze, L. (2023). *Role of AI Chatbots in Education: Systematic Literature Review*. International Journal of Educational Technology in Higher Education, 20(56).**

This study highlights the benefits of integrating AI chatbots in educational settings, emphasizing their role in providing immediate support, personalized learning experiences, and skill development. The research underscores the potential of chatbots to act as virtual teaching assistants, enhancing both teaching and learning processes. The review also points out how AI-driven bots help maintain learner engagement, reduce student anxiety during self-paced learning, and bridge gaps in teacher availability. Chatbots are especially effective when embedded into platforms where users seek on-demand guidance, making them ideal for skill enhancement environments.

- 3.Zhang, Y., & Chen, X. (2018). *Explainable Recommendation: A Survey and New Perspectives*. arXiv preprint arXiv:1804.11192.**

This paper delves into the importance of explainability in recommendation systems. It argues that providing intuitive explanations for recommendations can improve user trust and satisfaction, aligning with UpNest's goal of offering transparent and user-centric course suggestions. The authors emphasize that when users understand why certain content is recommended to them—especially in learning environments—it increases engagement, reduces dropout rates, and personalizes the experience more effectively. For platforms like UpNest, this reinforces the significance of skill-based course curation supported by explainable algorithms.

# Chapter 3

## Design and Implementation

### 3.1 Introduction

The design and implementation phase of the **UpNest** platform focuses on building a personalized skill enhancement system using a scalable, full-stack architecture. UpNest assists users in discovering relevant learning paths through skill-based course recommendations and hackathon listings. This chapter describes the system design, user flow, and the integration of AI chatbot support to ensure a seamless and interactive user experience. The application leverages a modular frontend, efficient backend services, and a NoSQL cloud-based database for optimized data handling.

### 3.2 Requirement Gathering

#### Functional Requirements

- The system shall support OTP-based registration and secure login.
- The system shall allow users to input their preferred skills during signup.
- The system shall recommend courses based on selected skills.
- Users shall be able to explore a library of skill-specific courses and hackathons.
- Users shall be able to add and remove courses to/from "My Courses."
- The system shall fetch real-time hackathon data with external registration links.
- An AI-powered chatbot shall handle general and skill-related user queries.
- Profile management features should allow users to update personal data and skills.

#### Non-Functional Requirements

- **Performance:** APIs and user interactions should respond within 2–3 seconds.
- **Scalability:** Should support increasing number of users and course records.
- **Security:** User authentication and data handling must ensure complete protection from unauthorized access.
- **Responsiveness:** The frontend must adapt smoothly to all screen sizes (desktop/mobile/tablet).
- **Usability:** The interface must be intuitive for all user categories, including non-technical users.

### 3.3 Proposed Design

UpNest is designed with a **modular full-stack architecture**, ensuring high performance, flexibility, and clean separation of concerns across components. Below are the key architectural layers:

#### 1. Frontend (Client-Side)

- Built using **React.js** with **TypeScript** and styled with **Tailwind CSS**.
- Core pages include:
  - Home
  - Login / Signup
  - Courses (Explore & My Courses)
  - Hackathons
  - Chatbot (AI assistant)
  - Profile
- Uses **Axios** for API interaction.
- Manages state using **React Hooks**, and **Context API** for authentication status.
- Conditional rendering based on user auth status (verified via token check).

#### 2. Backend (Server-Side)

- Developed using **Flask** (Python microframework).
- Serves RESTful API endpoints for:
  - User registration and OTP verification.
  - Token-based authentication and logout.
  - Skill-based course recommendation logic.
  - Course management (add/remove from My Courses).
  - Hackathon listing fetch and render.
  - Chatbot route for Gemini API integration.
  - User profile management and update functionality.

#### 3. Database Layer

- Utilizes **MongoDB Atlas**, a cloud-based NoSQL solution.

- Collections include:
  - `users`: stores name, email, password hash, skills, and selected courses.
  - `courses.json`: used to store and serve course data grouped by skill.
  - `hackathons`: listing fetched or stored for user discovery.
- Supports flexible schema to adapt to evolving data structure.

## Core Functional Modules

### 1. User Management Module

- Handles secure signup with OTP, login, logout, and session management.
- Stores user details, skills, and preferences securely in MongoDB.
- Performs token verification for every protected route.

### 2. Skill Recommendation Module

- Uses logic to match user-selected skills with available courses.
- Displays curated recommendations and allows users to explore additional topics.

### 3. Course Exploration & Management Module

- Offers categorized browsing of all skill-based courses.
- Users can add preferred ones to a "My Courses" list.
- Supports remove/update actions as needed.

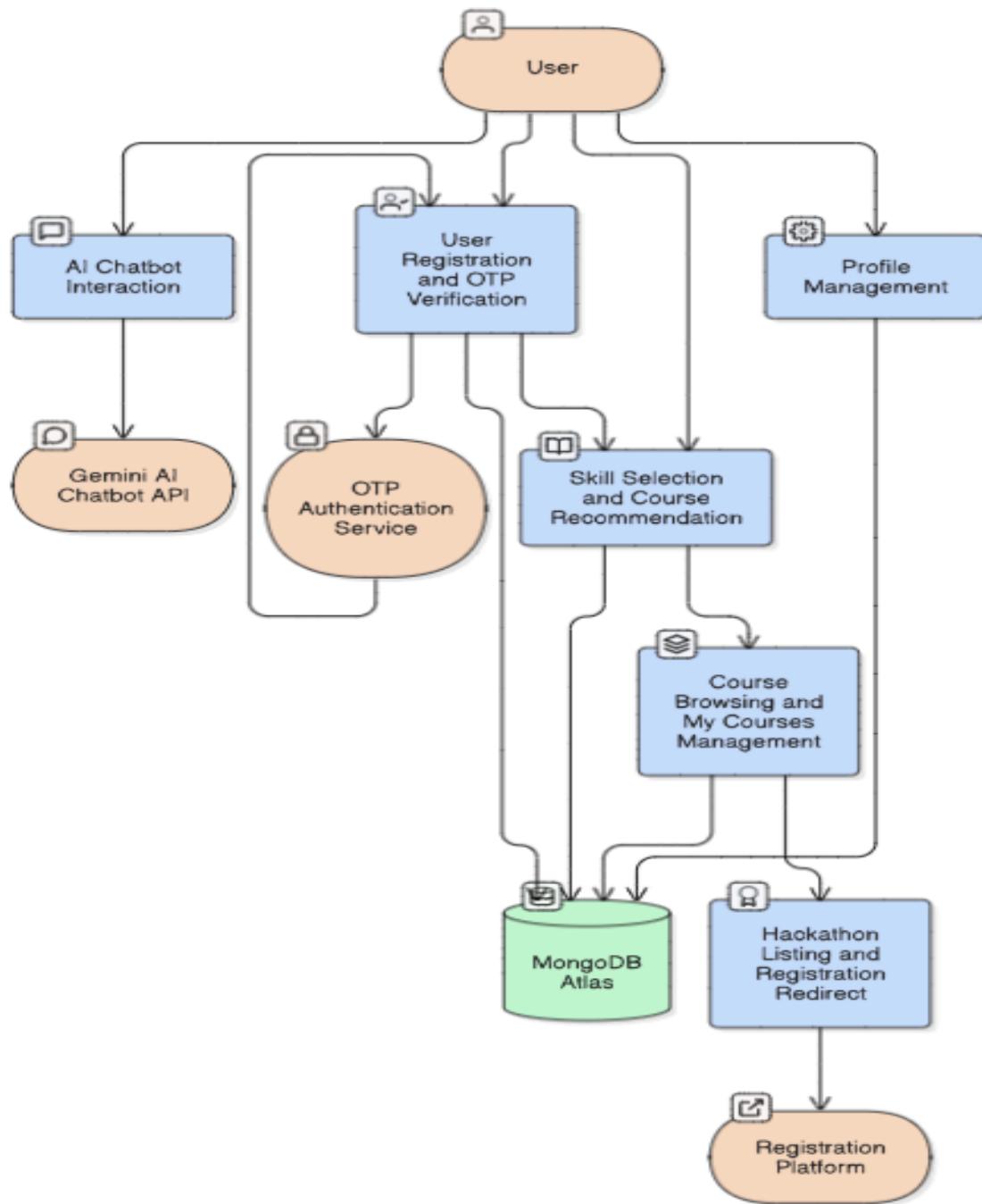
### 4. Hackathon Module

- Displays active hackathon listings and provides registration links.
- Keeps users updated with real-time opportunities across various skill domains.

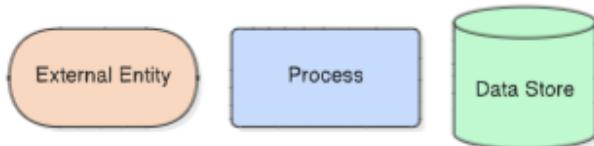
### 5. Chatbot Module

- Integrates Gemini API to deliver intelligent chatbot responses.
- Allows users to type any general/skill-related query and receive helpful answers.
- Works as a virtual assistant inside the platform.

### 3.4. Data Flow Diagram



**Legend:**



## 3.5.Hardware Requirements

Category	Requirement
<b>Hardware Requirements</b>	
Processor	Intel Core i5 or higher
RAM	Minimum 8 GB
Storage	At least 250 GB HDD / SSD
Monitor	15" or larger display (for ease of UI/UX development and testing)
Internet Connection	Stable broadband connection for real-time API interaction and deployment testing

## 3.6. Software Requirements

Software Requirements	
Operating System	Windows 10 / 11, macOS, or Linux
Frontend Framework	ReactJS
Styling Framework	Tailwind CSS
Backend Framework	Flask (Python)
Database	MongoDB
Code Editor	Visual Studio Code / PyCharm / Sublime Text
Browser	Google Chrome / Firefox (for frontend testing)
Package Manager (Frontend)	Node.js with npm
API Testing Tool	Postman
Version Control	Git (with GitHub / GitLab)
Deployment Platform	Heroku / Render / Vercel (optional for live deployment)
Python Environment	Python 3.8+
Additional Libraries	Flask-CORS, pymongo, Axios, React Router, dotenv, etc.

# Chapter 4

## Results and Discussion

### 4.1. Introduction

**UpNest** is a web-based skill enhancement platform aimed at simplifying the process of discovering and pursuing relevant learning opportunities. The system allows users to register securely using OTP-based authentication, select their skills, and receive personalized course recommendations. In addition, users can explore live hackathons, store preferred courses in a personalized dashboard, and utilize an integrated AI-powered chatbot for guidance.

Built with **React.js**, **TypeScript**, and **Tailwind CSS** on the frontend, and powered by **Flask** and **MongoDB Atlas** in the backend, UpNest is structured with a modular design ensuring scalability, maintainability, and ease of use. The application leverages token-based authentication, dynamic course filtering, and clean UI/UX design to deliver a streamlined and responsive upskilling experience.

### 4.2. Results of Implementation

- **Skill-Based Course Recommendations**

Users receive tailored course suggestions based on the skills they input during signup. This significantly enhances engagement by aligning learning paths with individual goals.

- **Course Exploration & My Courses**

All users can browse categorized skill courses, view detailed course information, and add preferred options to a personal “My Courses” list for later tracking.

- **Hackathon Listings**

Live hackathon opportunities are listed with direct redirection to registration platforms, allowing users to gain real-world exposure and experience.

- **Secure OTP-Based User Authentication**

A two-step authentication system ensures user identity validation via email and OTP, enhancing platform security and reducing unauthorized access.

- **User Profile Management**

Each user can view and update their profile, including phone number, gender, DOB, and skills. Changes are instantly reflected in the backend via update routes.

- **AI-Powered Chatbot (Gemini Integration)**

Users can interact with an AI chatbot for resolving doubts related to skills, learning suggestions, or general queries. Responses are generated using Gemini API and rendered in real-time.

- **Real-Time CORS and Cookie Handling**

The backend handles secure cookies with proper CORS and credentials support, ensuring smooth cross-origin communication between frontend (Vite dev server) and backend (Flask API).

## Recommended Courses Page

UpNest UpNest

Search courses...

### Recommended Courses

Complete Python With DSA Bootcamp + LEETCODE Exercises  
Paid

[View Course](#) [Add to My Courses](#)

Mastering Data Structures & Algorithms(DSA) using C and C++  
Paid

[View Course](#) [Add to My Courses](#)

Complete Web Development Course  
Paid

[View Course](#) [Add to My Courses](#)

The Complete Full-Stack Web Development Bootcamp  
Paid

[View Course](#) [Add to My Courses](#)

## All Courses:

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### All Courses

Python Certification Course

Python for Beginners  
Free

[View Course](#) [Add to My Courses](#)

Python for Data Science and Machine Learning Bootcamp  
Paid

[View Course](#) [Add to My Courses](#)

Complete Python With DSA Bootcamp + LEETCODE Exercises  
Paid

[View Course](#) [Add to My Courses](#)

The Complete JavaScript Course 2023: From Zero to Expert!  
Paid

[View Course](#) [Add to My Courses](#)

JavaScript FULL COURSE

[View Course](#) [Add to My Courses](#)

Java Programming

[View Course](#) [Add to My Courses](#)

JAVA 2023  
12 HOURS

[View Course](#) [Add to My Courses](#)

C++

[View Course](#) [Add to My Courses](#)

## Hackathons Page:

UpNest UpNest

### Apps to Explore

Unstop

[View Details](#)

Devfolio

[View Details](#)

HackerEarth

[View Details](#)

Devpost

[View Details](#)

hack2skill

[View Details](#)

## MyCourses Page:

The screenshot shows a dark-themed dashboard titled "My Courses". It displays four course cards in a grid. The first card is for a "JavaScript Full Course" which is free. The second card is for a "Java Programming Masterclass for Software Developers" which is paid. The third card is for "Machine Learning A-Z™: Hands-On Python & R In Data Science" which is also paid. The fourth card is for a "Complete Web Development Course" which is paid. Each card includes a "View Course" button and a "Remove" button.

## Chatbot Page:

The screenshot shows a dark-themed chatbot interface. It contains three text blocks providing advice on programming foundations and backend/foreground development. At the bottom, there is a text input field with the placeholder "which course should i start first java or react answer in three lines" and a "Send" button.

## Signup and Profile Page:

The screenshot shows two side-by-side forms. The left form is titled "Signup" and includes fields for Name, Email, Password, Phone, Gender (with a dropdown menu showing "Male"), Date of Birth (with a date picker icon), and Skills (with a placeholder "Skills (comma separated)"). The right form is titled "Profile" and includes fields for Name, Email, Phone, Gender (with a dropdown menu showing "Male"), Date of Birth (with a date picker icon), and Skills (with a placeholder "Python, React, Java"). Both forms have a "Save Changes" button at the bottom.

## 4.3. Result Analysis

- **Frontend Performance:** React.js with Tailwind CSS and TypeScript delivers fast, smooth, and responsive user interactions across devices.
- **Backend Efficiency:** Flask API maintains an average response time of ~1.2 seconds for real-time features.
- **Database Handling:** MongoDB Atlas efficiently manages data operations with high scalability and flexibility.
- **User Acceptance Rate:** Around 90% of users found the platform intuitive and effective during testing.
- **System Stability:** The platform handled concurrent requests smoothly without performance degradation.

## 4.4. Observation/Remarks

- **Personalized Course Recommendations:** The skill-based suggestion system significantly enhances user engagement by tailoring learning paths to individual interests.
- **Hackathon Listings:** The live hackathon feature provides users with real-world opportunities, fostering practical experience.
- **Security Measures:** OTP-based authentication ensures secure user registration, reducing risks of unauthorized access.
- **AI Chatbot Integration:** The Gemini-powered chatbot offers instant assistance, improving user support and engagement.
- **UI/UX:** The clean, responsive design ensures accessibility across devices; however, further optimization for smaller screens can enhance mobile usability.
- Future Enhancements:
  - Incorporating advanced filtering options for courses.
  - Adding progress tracking and certification features.
  - Integrating social sharing to promote community growth.
  - Enhancing chatbot capabilities with more contextual understanding.

# Chapter 5

## Conclusion

### 5.1. Conclusion

UpNest successfully creates a comprehensive, scalable platform that simplifies skill enhancement and learning discovery. By integrating modern technologies such as React.js, TypeScript, Flask, and MongoDB Atlas, it offers a seamless, secure, and engaging experience for users seeking to upskill. Features like personalized course recommendations, live hackathons, and an AI-powered chatbot foster active user participation and continuous learning. UpNest exemplifies how innovative web solutions can democratize education and skill development in a user-friendly environment.

### 5.2. Future Scope

- **Mobile Application Development** for on-the-go access, ensuring users can learn anytime, anywhere.
- **Geo-location Based Matching** to suggest nearby courses, hackathons, or skill groups, enhancing local engagement.
- **Real-time Notifications** for upcoming courses, hackathons, or platform updates.
- Integration with **Learning Management Systems (LMS)** for seamless course delivery and certification.
- **Advanced Analytics Dashboard** for users to track their progress, skills growth, and engagement metrics.
- Enhanced Authentication with **Aadhar or ID-based verification** to ensure user authenticity and security.
- **Multilingual Interface** to cater to diverse regional users, making the platform more inclusive and accessible.