



# International Journal of Research Publication and Reviews

Journal Homepage: [www.ijrpr.com](http://www.ijrpr.com) ISSN 2582-7421

## Hackmatch AI- Powered Hackathon Management Portal

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### ABSTRACT

Hackathons provide an effective platform for students and developers to showcase their technical skills, creativity, and problem-solving abilities. However, identifying suitable hackathon teammates based on skills, interests, and project requirements remains a challenging task. Traditional team formation methods often rely on manual searching and personal connections, which may lead to inefficient collaboration and skill mismatches. This paper presents **HACKMATCH AI**, an intelligent platform designed to simplify hackathon team formation through skill-based matching and AI-assisted recommendations. The system enables users to create profiles, specify their technical skills, interests, and project requirements, and discover potential teammates based on compatibility. It also supports collaboration requests, request acceptance, and saved login records to provide a more organized and personalized user experience. The platform aims to connect participants with complementary skill sets, reduce the time required to identify suitable teammates, and encourage effective collaboration among hackathon enthusiasts. By integrating intelligent matching mechanisms with a user-friendly interface, HACKMATCH AI provides a centralized environment for discovering teammates and managing collaboration activities. The proposed system demonstrates the potential of AI-assisted matching in improving the accessibility and efficiency of hackathon team formation.

**Keywords**--HACKMATCH AI, Artificial Intelligence, Hackathon Team Formation, Skill-Based Matching, Teammate Recommendation, Collaboration, Compatibility Analysis.

### INTRODUCTION

Hackathons provide an effective platform for students, developers, and technology enthusiasts to develop innovative solutions to real-world problems. These events encourage creativity, technical learning, teamwork, and problem-solving within a limited time. However, finding suitable teammates with complementary technical skills, shared interests, and compatible project goals remains a major challenge. Traditional team formation often depends on personal connections, manual searching, and informal communication, which may result in skill mismatches and inefficient collaboration.

The success of a hackathon project depends not only on the quality of the idea but also on the combined expertise of its team members. Participants may possess different skills, such as programming, frontend development, backend development, artificial intelligence, database management, and UI/UX design. Identifying individuals whose skills complement one another can improve task distribution and support effective project development. An intelligent matching mechanism can help participants discover suitable teammates based on their technical profiles and collaboration requirements.

This study presents HACKMATCH AI, an AI-assisted platform designed to simplify hackathon teammate discovery and team formation. The system enables users to create profiles, provide their technical skills and interests, explore potential collaborators, and send collaboration requests. It aims to connect participants based on relevant skills and project requirements, reducing the effort involved in manual teammate searching.

The platform also supports collaboration request management, including accepting or rejecting requests, along with saved login records for a more organized user experience. These features help users manage their interactions and maintain a structured workflow while discovering potential teammates. The system provides a centralized environment for connecting hackathon participants and encouraging collaborative innovation.

HACKMATCH AI integrates intelligent matching capabilities with a user-friendly interface to improve the accessibility and efficiency of team formation. The recommendations are intended to assist users in identifying relevant collaborators rather than guaranteeing successful team performance. The effectiveness of the matching process depends on the accuracy of user-provided information and the implemented recommendation logic.

The contributions of this work are:

1. The development of an AI-assisted platform for hackathon teammate discovery and team formation.
2. A skill-based matching approach to identify potential collaborators according to user profiles and project requirements.
3. A collaboration request mechanism that enables users to send, receive, and manage teammate requests.
4. A centralized platform for exploring potential teammates and organizing collaboration activities.

5. An integrated user interface designed to simplify teammate discovery and improve the overall user experience.

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## OBJECTIVE

The primary objective of HACKMATCH AI is to develop an intelligent platform that simplifies hackathon teammate discovery by matching participants based on their technical skills, interests, experience, and project requirements.

The system aims to overcome the challenges of traditional team formation methods by providing a centralized platform where users can discover potential teammates with complementary skill sets. This helps reduce manual searching and supports faster and more effective team formation.

Another objective is to implement an AI-assisted matching mechanism that identifies suitable collaborators based on the information provided in user profiles. By considering relevant skills and project preferences, the platform aims to improve the relevance of teammate recommendations and encourage balanced team formation.

The platform also aims to provide an organized collaboration request management system through which users can send, receive, accept, or reject teammate requests. Saved login records and user profile management further support a convenient and structured user experience.

Finally, HACKMATCH AI aims to promote teamwork, knowledge sharing, and interdisciplinary collaboration among hackathon participants. By connecting individuals with diverse technical abilities, the system seeks to encourage innovation and help participants collaborate effectively in developing solutions to real-world problems.

1. To develop an AI-assisted platform for identifying suitable hackathon teammates based on technical skills, interests, and project requirements.
2. To create user profiles that capture participants' technical expertise, preferred domains, and collaboration interests.
3. To implement a skill-based matching mechanism for recommending potential teammates with complementary abilities.
4. To reduce the time and effort required for manual teammate searching through intelligent recommendations.
5. To provide a collaboration request management system that allows users to send, receive, accept, and reject teammate requests.
6. To maintain saved login records and organized user information for convenient access and improved user experience.
7. To design a user-friendly interface that enables participants to explore potential collaborators and manage team formation activities efficiently.
8. To encourage teamwork, knowledge sharing, and interdisciplinary collaboration among hackathon participants to support the development of innovative solutions.

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## LITERATURE SURVEY

### 1. Machine Learning for Team Formation

Machine learning techniques help identify suitable teammates by analysing skills, interests, and experience. These methods provide a foundation for intelligent team formation in HACKMATCH AI. Complementary skill analysis can also help distribute responsibilities among team members more effectively.

### 2. Influence of Skills and Interests

Participants' technical skills and interests play an important role in hackathon team formation. Matching complementary skills can improve team compatibility and collaboration. Considering individual project preferences can further help participants find teammates with similar goals.

### 3. AI-Based Teammate Recommendation

AI-based recommendation systems analyse user profiles and project requirements to suggest suitable collaborators. HACKMATCH AI applies this concept to simplify teammate discovery. Such recommendations can reduce manual searching and help users explore relevant collaboration opportunities.

### 4. Collaboration Request Management

Collaboration platforms enable users to connect through invitations and requests. Request acceptance and rejection features help participants manage team formation according to their preferences. A structured request management process also helps users track collaboration activities efficiently.

### 5. Research Gap and Motivation

Traditional teammate selection often depends on manual searching and personal connections. HACKMATCH AI aims to provide a centralized platform for efficient, skill-based teammate discovery. Integrating matching and request management in one platform can make the team formation process more organized.

## 6. Challenges in Existing Systems

Traditional team formation platforms may not effectively consider skill compatibility, project requirements, and individual preferences. Manual searching can also consume time and limit opportunities to connect with suitable participants. HACKMATCH AI aims to address these challenges through centralized teammate discovery and organized collaboration requests.

## 7. Summary

Intelligent matching, user profiles, and collaboration management can simplify hackathon team formation. HACKMATCH AI integrates these concepts to support a more organized and accessible collaboration experience. The platform aims to encourage knowledge sharing and teamwork among participants with diverse technical backgrounds.

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## METHODOLOGY

The methodology of HACKMATCH AI consists of user data collection, profile creation, skill analysis, teammate matching, recommendation generation, collaboration request management, and system evaluation. The platform helps hackathon participants discover potential teammates based on their technical skills, interests, and project requirements.

### 1. User Data Collection

User information is collected through registration and profile creation. The details include:

- Name and basic profile information.
- Technical skills and areas of interest.
- Preferred project domains and collaboration requirements.

### 2. Profile Creation and Management

Each participant maintains a profile containing relevant technical and personal information. The profile helps the system understand the user's capabilities and preferences. Users can update their details to improve the relevance of teammate recommendations.

### 3. Skill Analysis

The system analyses the skills and interests provided by participants. Skills are compared with project requirements and the expertise of other users. This process helps identify complementary abilities required for effective team formation.

### 4. AI-Based Teammate Matching

The matching module identifies potential teammates by comparing user profiles, technical skills, and project interests. Based on the implemented matching logic, suitable participants are ranked or recommended according to their compatibility.

### 5. Recommendation Generation

The system presents relevant teammate suggestions to users. Participants can explore recommended profiles and identify collaborators whose skills and interests align with their project goals. This reduces the need for manual searching.

### 6. Collaboration Request Management

Users can initiate collaboration by sending requests to potential teammates. The platform supports:

- Sending and receiving teammate requests.
- Accepting or rejecting collaboration requests.
- Viewing and managing request status.
- Maintaining saved login records for convenient access.

### 7. System Integration and Evaluation

The frontend and backend components are integrated to provide a unified user experience. The system is evaluated by checking profile management, matching results, request handling, and login functionality. Testing helps identify errors and improve the usability and reliability of the platform.

### 8. Security and Data Management

The platform maintains user information and login records to support organized access and profile management. Appropriate validation is used to handle user inputs and collaboration requests. The system aims to maintain data consistency and provide a reliable experience while users interact with teammate recommendations and request management features.

## 9. User Interface and Accessibility

The platform provides a simple and user-friendly interface that allows participants to navigate profiles, explore teammate recommendations, and manage collaboration requests easily. The interface organizes essential features clearly, helping users access platform functionalities with minimal effort and improving the overall user experience.

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## EXISTING SYSTEM

### 1. Manual Teammate Selection

#### How it works:

Participants find hackathon teammates through friends, college groups, social media, and personal contacts.

#### Drawbacks:

- Depends heavily on personal connections.
- Finding participants with suitable skills can be difficult.
- Requires considerable time and manual effort.
- May result in teams with unbalanced skills.

### 2. Social Media-Based Team Formation

#### How it works:

Participants use online communities and social media platforms to post collaboration requirements and connect with interested individuals.

#### Drawbacks:

- Relevant participants may be difficult to identify.
- Skill compatibility is not always evaluated.
- Messages and collaboration requests may be missed.
- Team formation can become unorganized.

### 3. General Professional Networking Platforms

#### How it works:

Users explore professional profiles and connect with people based on their experience, technical skills, and interests.

#### Drawbacks:

- Platforms may not focus specifically on hackathon requirements.
- Project-specific teammate matching may be limited.
- Users must manually evaluate potential collaborators.
- Finding complementary skills can be time-consuming.

### 4. Basic Team Matching Platforms

#### How it works:

Participants are connected using predefined criteria such as interests, project categories, or selected skills.

#### Drawbacks:

- Matching may rely on limited profile information.
- Advanced compatibility analysis may be unavailable.
- Recommendations may not reflect changing project needs.
- Collaboration management features may be limited.

## 5. Manual Collaboration Request Management

### How it works:

Participants contact potential teammates individually and manage invitations through messages or other communication tools.

### Drawbacks:

- Request status can be difficult to track.
- Conversations may be scattered across platforms.
- Accepting and rejecting requests may lack a centralized workflow.
- Managing multiple collaboration requests can be confusing.

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## PROPOSED SYSTEM

The proposed HACKMATCH AI system provides an intelligent platform for hackathon participants to discover suitable teammates based on their technical skills, interests, and project requirements. It integrates profile management, AI-assisted matching, teammate recommendations, and collaboration request management into a centralized application.

### 1. User Registration and Profile Creation

**Objective:** Create user profiles containing relevant skills and preferences.

#### How It Works:

- Users register and log in to the platform.
- Participants enter their technical skills and areas of interest.
- Profile information helps identify potential collaborators.
- Users can update their details when required.

### 2. Skill Analysis and Matching

**Objective:** Identify compatible teammates based on technical expertise.

#### How It Works:

- The system analyses skills provided in user profiles.
- Technical skills are compared with project requirements.
- Complementary skill sets help identify potential team members.
- Matching results depend on the implemented recommendation logic.

### 3. AI-Based Teammate Recommendation

**Objective:** Recommend suitable participants for hackathon collaboration.

#### How It Works:

- The system evaluates available user profile information.
- Relevant participants are identified based on matching criteria.
- Recommended profiles are presented to users.
- Users can explore potential teammates before sending requests.

### 4. Project Interest and Requirement Matching

**Objective:** Connect participants with similar project goals and interests.

#### How It Works:

- Users specify their preferred project domains.
- The system considers shared interests and relevant skills.
- Participants can discover collaborators with compatible goals.

- This supports more focused team formation.

## 5. Collaboration Request Management

**Objective:** Provide an organized process for connecting participants.

**How It Works:**

- Users send collaboration requests to potential teammates.
- Recipients can accept or reject incoming requests.
- Request status helps users track collaboration activities.
- Centralized request handling reduces communication confusion.

## 6. Saved Login and User Access

**Objective:** Support convenient access to the platform.

**How It Works:**

- Users log in through the available authentication system.
- Saved login records can help organize access information.
- User sessions and profile access are handled through the application.
- Appropriate authentication safeguards help protect accounts.

## 7. Interactive User Interface

**Objective:** Provide a simple and accessible teammate discovery experience.

**How It Works:**

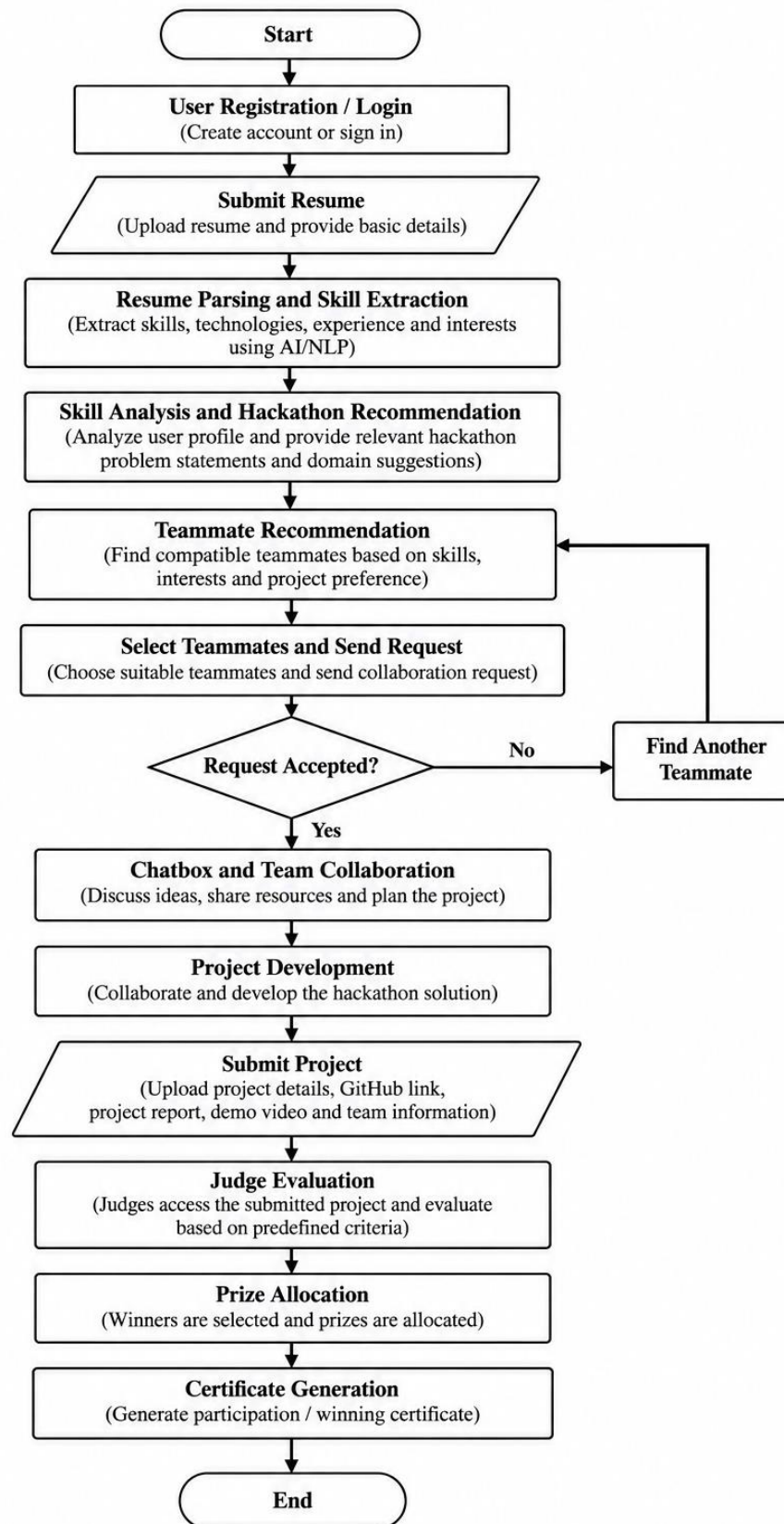
- Users navigate profiles and recommendations through the interface.
- Relevant information is organized into clear sections.
- Collaboration requests can be managed within the platform.
- Responsive design can improve accessibility across devices.

## 8. System Integration and Testing

**Objective:** Ensure the platform's major functionalities work together reliably.

**How It Works:**

- Frontend and backend components are integrated.
- Profile creation and login functionality are tested.
- Matching results and collaboration requests are verified.
- Errors are identified and corrected to improve usability.

**FLOWCHART:**

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## SYSTEM REQUIREMENTS

### Hardware Requirements

- Processor: Intel Core i3 or above
- RAM: Minimum 4 GB (8 GB recommended)
- Storage: Minimum 5 GB free disk space
- Internet connection for accessing AI services and online features
- Display device capable of running a modern web browser

### Software Requirements

- Frontend: React.js
- UI Styling: HTML, CSS, JavaScript, Tailwind CSS
- Backend: Node.js and Express.js
- Database: MongoDB
- Database Integration: Mongoose
- Authentication: JSON Web Token (JWT) and bcrypt
- AI Integration: AI API for intelligent teammate matching
- Real-Time Communication: Socket.IO
- Development Tools: Visual Studio Code
- Version Control: Git and GitHub
- Package Manager: npm
- Web Browser: Google Chrome or Microsoft Edge
- Operating System: Windows 10 or above
- Internet Access: Required for API integration and online platform access
- Deployment Platform: Vercel / Render, depending on deployment

### Development and Supporting Tools

- Code Editor: Visual Studio Code
- API Testing: Postman
- Source Code Management: Git
- Code Repository: GitHub
- Frontend Build Tool: Vite
- Database Management: MongoDB Atlas / MongoDB Compass
- Browser Developer Tools: Chrome DevTools
- UI Design and Prototyping: Figma
- Dependency Management: npm
- Testing and Debugging: Browser Developer Tools and server logs

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## MODE OF DESCRIPTION

The HACKMATCH AI web application consists of the following main modules:

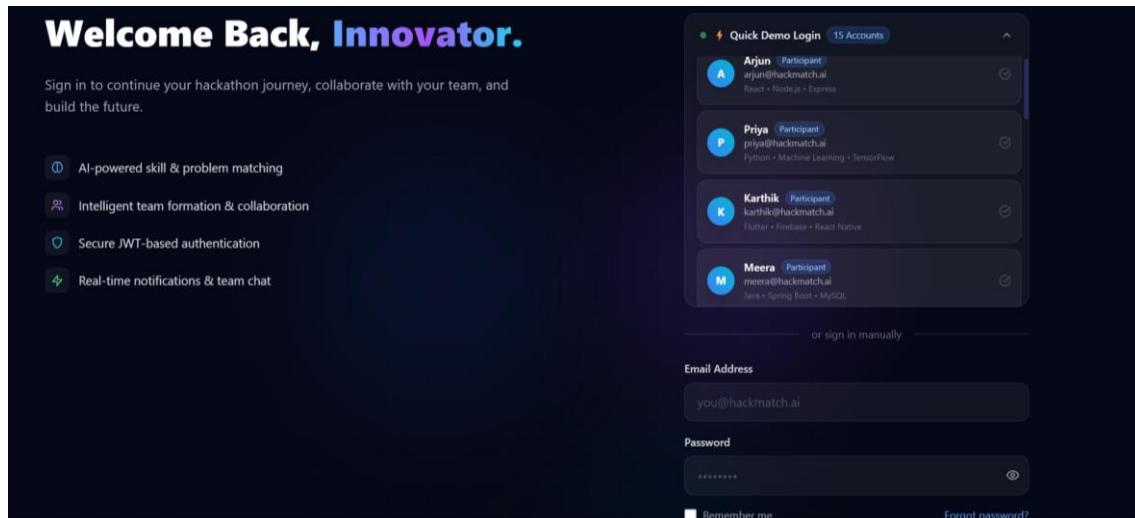
1. **Project Overview Interface :**

Home page of HACKMATCH AI look like



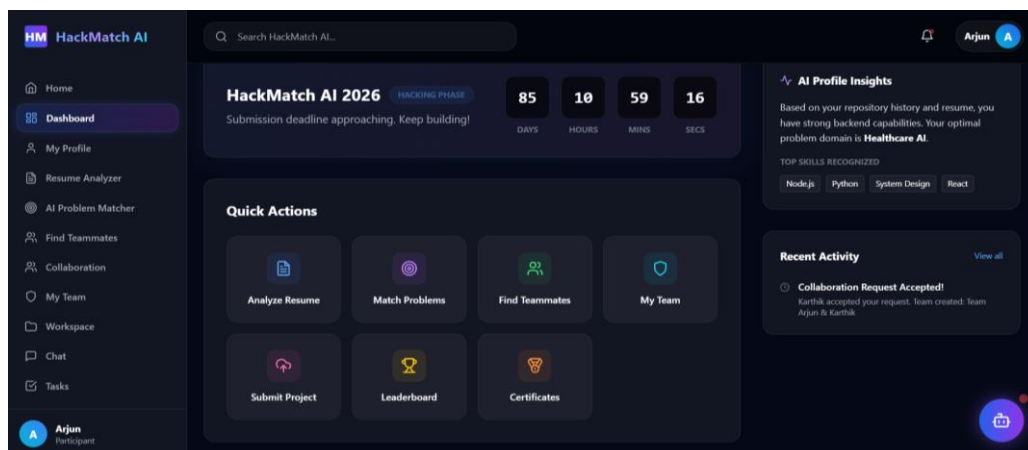
## 2. Login page :

Enables users to securely access their HACKMATCH AI accounts.



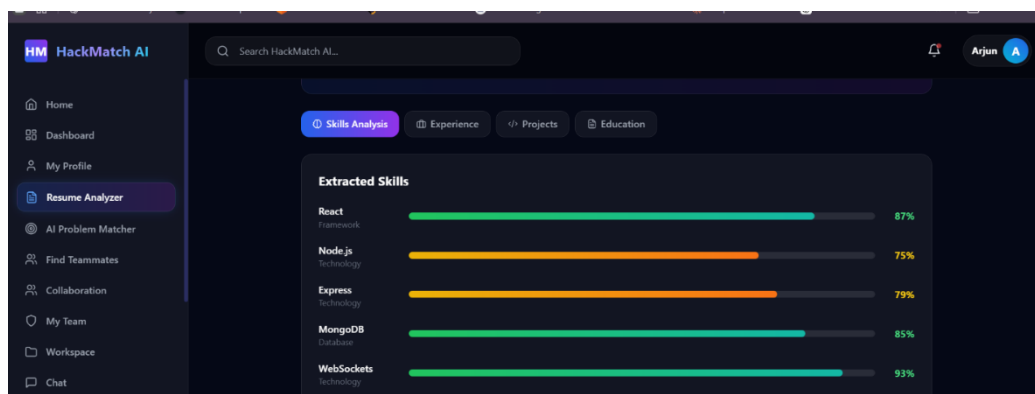
## 3. Dashboard

Presents fire-related geographical information and station details to support monitoring and response planning.



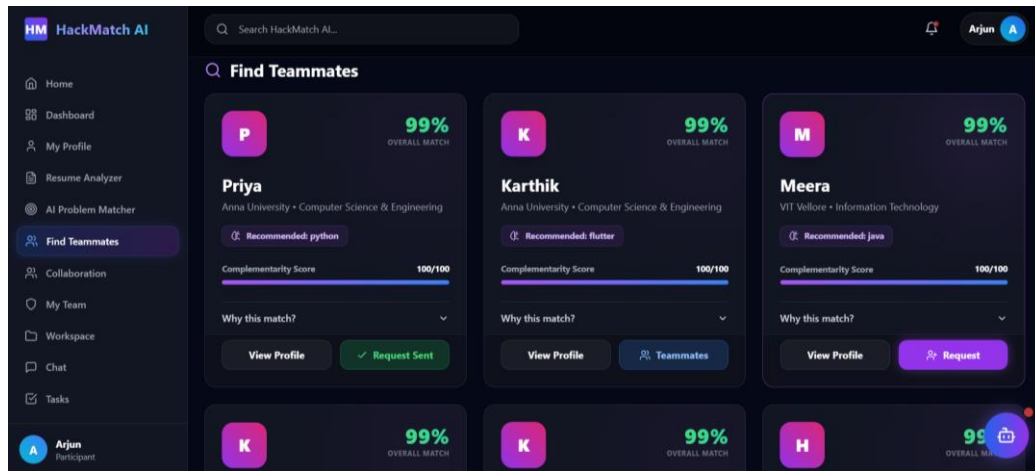
## 4. Resume Analyzer Interface:

Enables users to upload resumes for AI-based skill extraction and analysis.



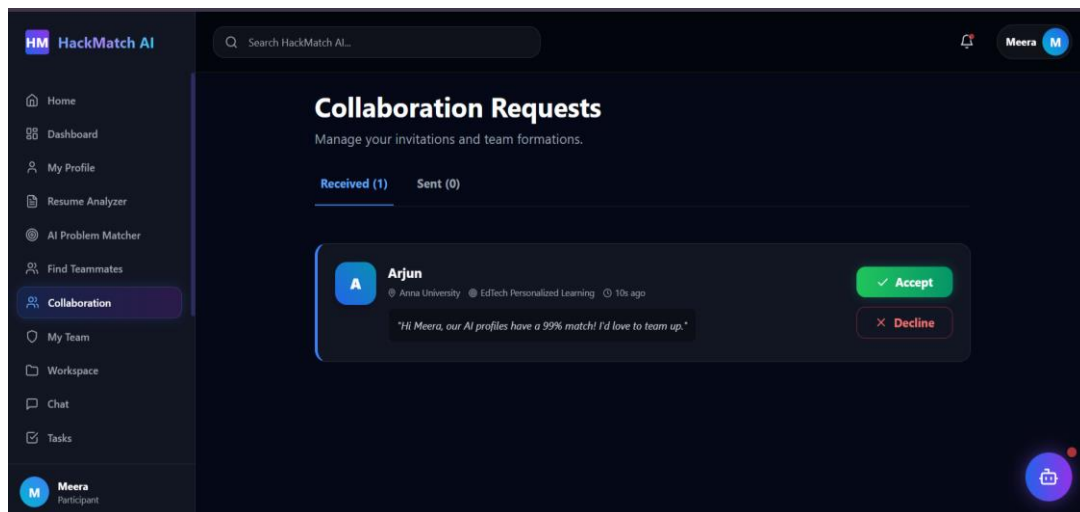
## 5. Teammates collaboration

Recommends compatible hackathon teammates based on skills and interests.



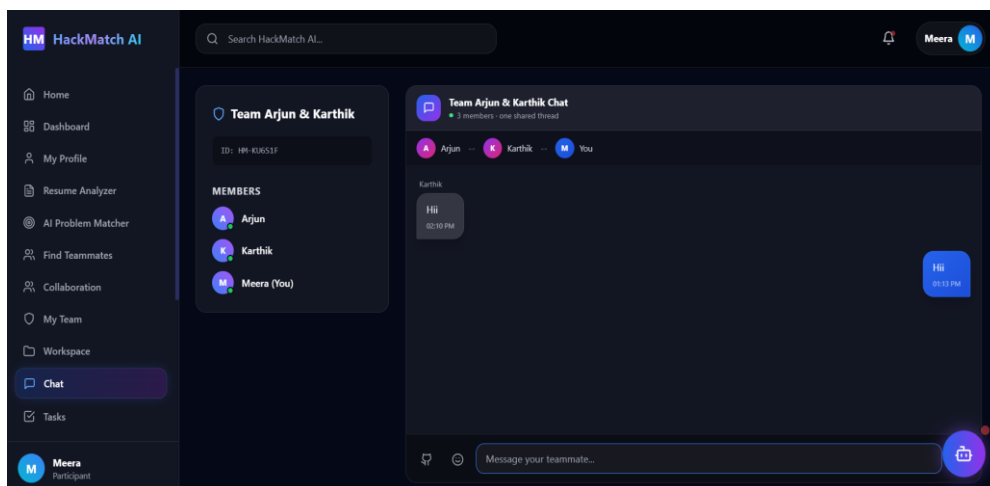
## 6. Collaboration Page:

Enables users to send collaboration requests and manage teammate interactions.



## 7. AI Chatbox

Provides AI-powered assistance for hackathon queries, project ideas, and technical guidance.



## 8. Project Details

Enables teams to submit project details, GitHub links, and demo URLs for evaluation.

The image displays three stacked screenshots of the HackMatch AI web application, showing the 'Project Details' form. The interface is dark-themed with a sidebar on the left containing navigation links: Home, Dashboard, My Profile, Resume Analyzer, AI Problem Matcher, Find Teammates, Collaboration, My Team, Workspace, Chat, and Tasks. The top right shows the user 'Arjun' with a profile icon and a search bar labeled 'Search HackMatch AI...'. The bottom left of the sidebar shows 'Arjun Participant' and 'localhost:5173/dashboard'.

**Top Screenshot: Basic Information**

- Project Title \***: Team Arjun & Karthik Solution
- Project Description**: AI-powered collaborative hackathon solution built with modern full-stack technologies.
- Solution Approach**: How does your solution address the problem?
- Save Changes** button.

**Middle Screenshot: Innovation & Impact**

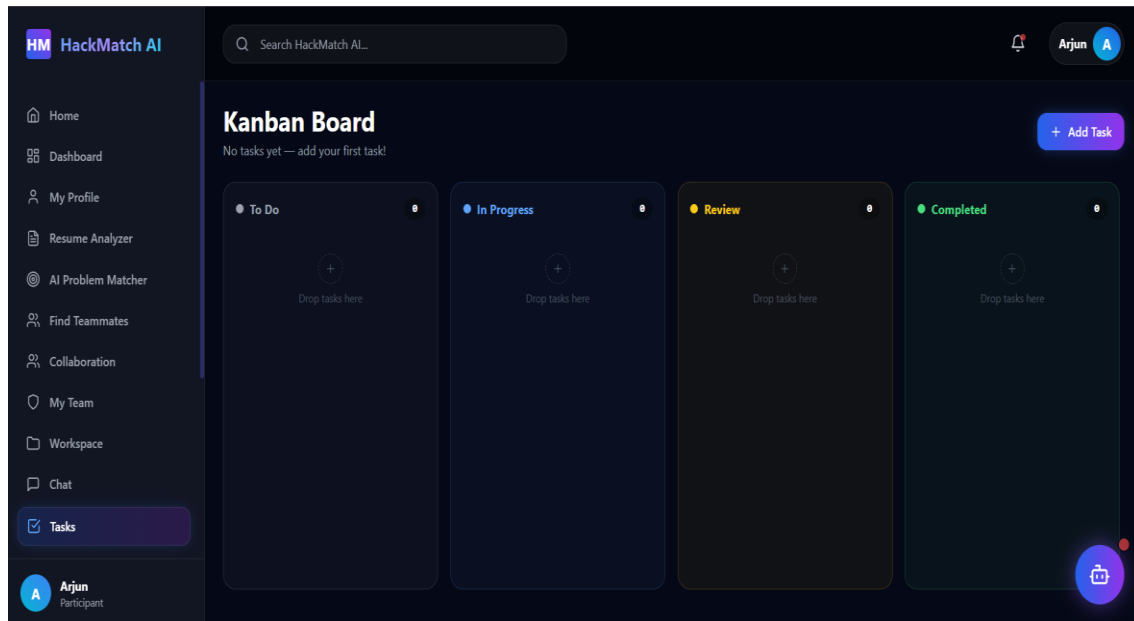
- What's Unique / Innovative**: Complementary AI multi-agent orchestration for hackathon matchmaking and real-time collaboration.
- Social / Technical Impact**: Accelerates high-impact cross-functional team formation across universities.
- Future Scope / Roadmap**: Global hackathon expansion, automated AI evaluation, and verified credentialing.
- Technical Stack** (partially visible): React, Node.js, Python, Tailwind CSS, MongoDB.
- Save All Changes** button.

**Bottom Screenshot: Technical Stack and Project Links**

- Key Features**: e.g., Real-time chat, AI matching...
- Architecture / System Design**: Describe your system architecture or paste a diagram description...
- Project Links**:
  - GitHub Repository**: <https://github.com/hackmatch/der>
  - Live Demo URL**: <https://hackmatch-demo.vercel.app>
  - Demo Video URL**: <https://youtube.com/watch?v=den>
- Save All Changes** button.

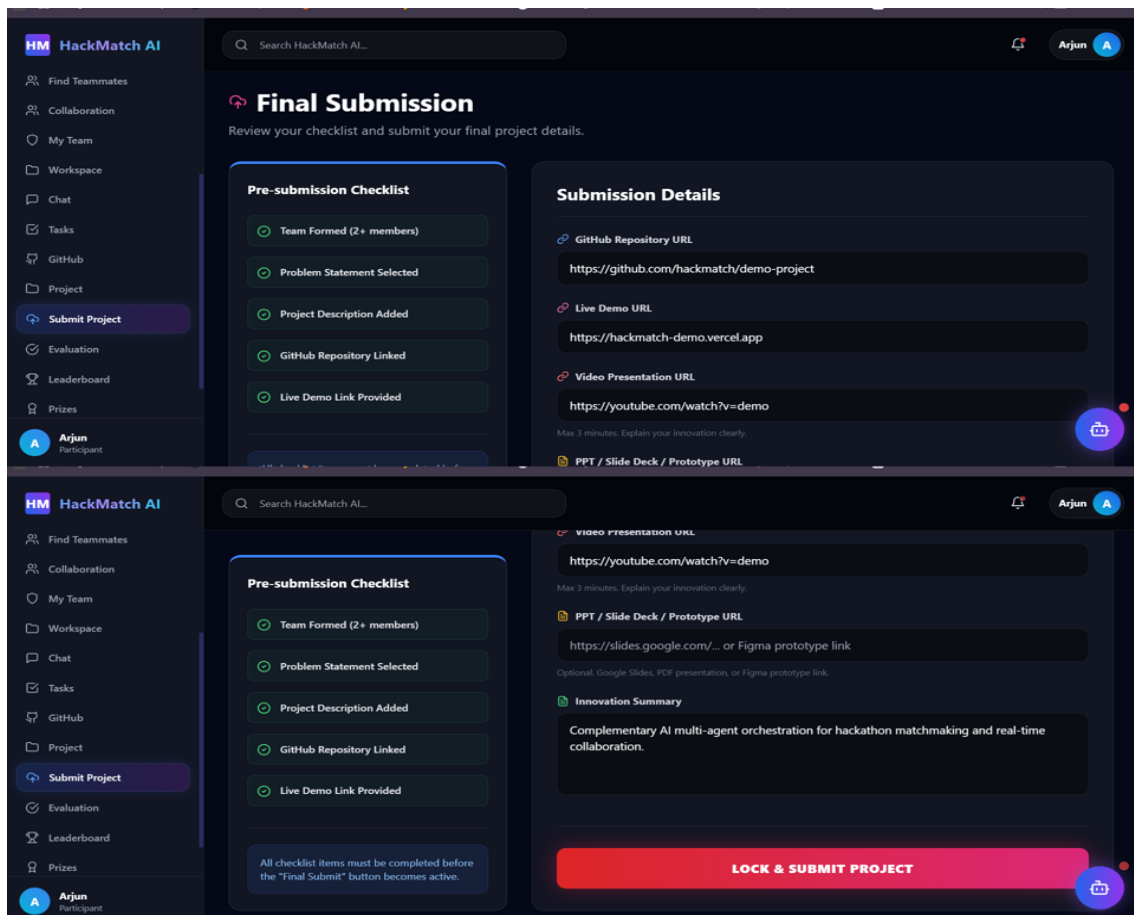
## 9. Progress Interface

Displays the progress status of the project



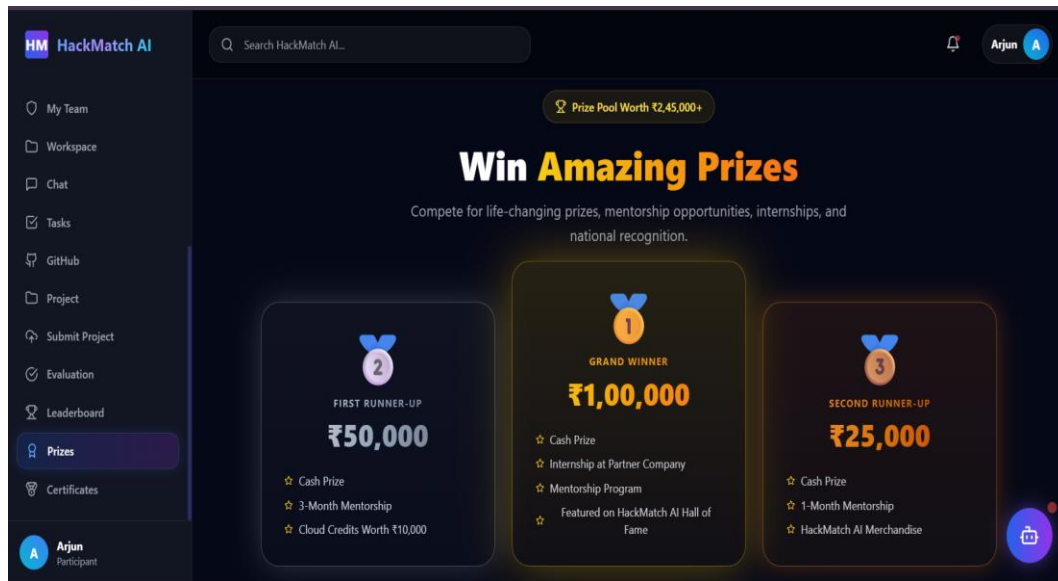
## 10. Project Submission

Allows teams to submit their completed projects, GitHub repository, demo video, and presentation links for judging.



## 11. Live Rankings:

Displays real-time hackathon team rankings based on judges' scores, project performance, and overall points.



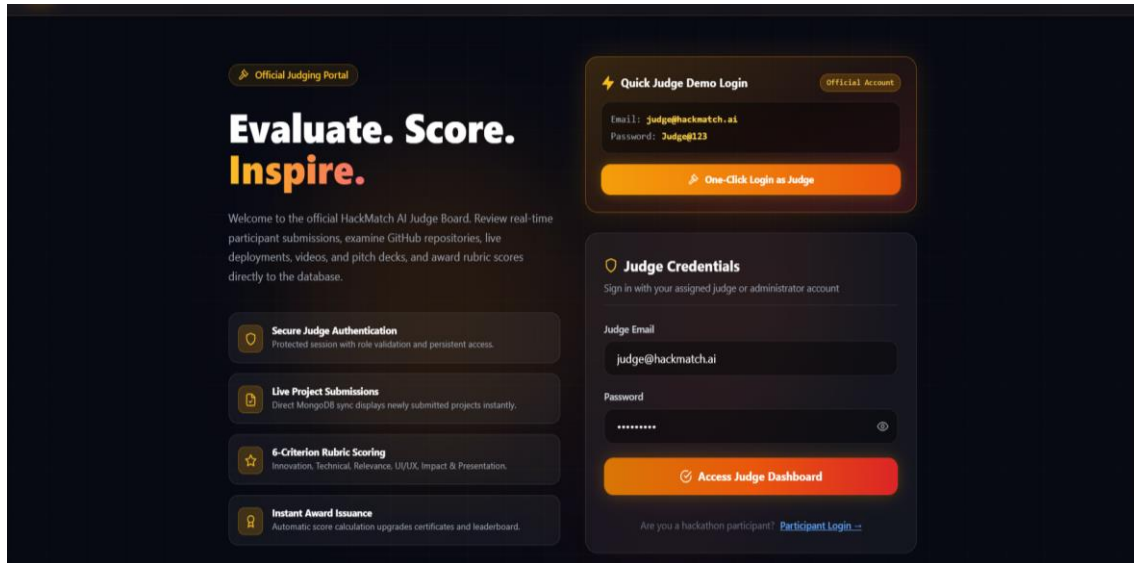
## 12. Certificate Interface

Provides downloadable certificates for participants based on hackathon results and project completion.



### 13. Judge login

Enables judges to securely log in and evaluate submitted hackathon projects.



## CONCLUSION

HACKMATCH AI provides an AI-powered platform for simplifying hackathon team formation and project collaboration. The system analyzes uploaded resumes to extract skills, technical knowledge, and interests, and recommends suitable hackathon problem statements and compatible teammates based on their profiles.

The platform supports collaboration requests, real-time team communication, project workspace management, and final project submission through GitHub repositories, live demos, and presentation links. It also provides judge-based project evaluation, live rankings, prize allocation, and certificate generation, creating a structured hackathon workflow from registration to completion.

Overall, HACKMATCH AI demonstrates how artificial intelligence can improve teammate matching, reduce the effort involved in team formation, and support efficient project development. Future enhancements may include more advanced skill-matching algorithms, improved evaluation analytics, secure certificate verification, and integration with external hackathon platforms.

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