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## Hack Hub

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### ABSTRACT

*Hackathons have become an essential part of technical education, encouraging students to apply their knowledge, enhance problem-solving skills, and work collaboratively in teams. However, many students face challenges while participating in hackathons, such as difficulty in finding suitable team members, lack of awareness about peers' skills, limited interaction across different classes or departments, and hesitation among introverted students to communicate openly. These challenges often lead to poor team formation or discourage students from participating in hackathons altogether. To overcome these issues, this project proposes a Hackathon Collaboration Website designed specifically for college students. The platform functions as a professional networking system similar to LinkedIn but focuses exclusively on hackathon-related collaboration. The website allows users to register, create detailed profiles, list their technical and nontechnical skills, share posts related to hackathon ideas, like and comment on posts, and communicate with other students through a chat feature. This helps students identify peers with similar interests and complementary skills, enabling effective team formation. The system is developed using HTML and CSS for the frontend interface, PHP for server-side processing, and MySQL (phpMyAdmin) for database management. The platform ensures secure data handling, easy accessibility, and a userfriendly interface. By providing a structured and centralized environment for interaction, the proposed system enhances collaboration, increases student participation in hackathons, and promotes inclusive teamwork within the college.*

**Keywords:** Hack Hub, Hackathon Platform, Student Collaboration, Web-Based System, Project Management, Team Formation, Peer Learning, Skill Development, Innovation Platform, College Ecosystem, Online Learning, Developer Community, Realtime Collaboration, Event Management System, Beginner-Friendly Platform, Technical Education, Software Development, Knowledge Sharing, Campus Networking, Collaborative Learning.

### INTRODUCTION

Hackathons require collaboration between students with diverse skills such as coding, design, presentation, and problem analysis. Currently, students rely on informal methods like classroom discussions or social media groups to find teammates. These methods are inefficient and do not guarantee skill-based matching. The proposed system introduces a structured and secure web platform where students can interact professionally. By allowing users to create profiles, share skills, and communicate openly, the system promotes collaboration and teamwork. The platform acts as a bridge between students from different classes and branches within the college. In the rapidly evolving landscape of technology, practical exposure and collaborative learning have become essential for students to develop industry-relevant skills. Traditional classroom education often emphasizes theoretical knowledge, which may not sufficiently prepare students for real-world problem-solving and innovation. As a result, platforms that encourage hands-on learning, teamwork, and experimentation—such as hackathons and coding communities—have gained significant importance. Existing platforms like Devfolio and Unstop provide opportunities for students to participate in hackathons and competitions. Similarly, organizations such as Google Developer Student Clubs and IEEE promote technical engagement through workshops and events. However, these platforms and communities often operate at a broader level and may not fully address the need for a centralized, college-specific ecosystem that supports continuous learning and collaboration. Moreover, while tools like GitHub enable version control and project sharing, and Discord facilitates communication, they are not specifically tailored to guide beginners or integrate structured learning with project development in an academic setting. To overcome these limitations, this paper presents the development of a Hack Hub—a dedicated web-based platform designed specifically for college students. The Hack Hub aims to provide a unified environment where students can learn new technologies, collaborate on projects, participate in internal hackathons, and track their progress.

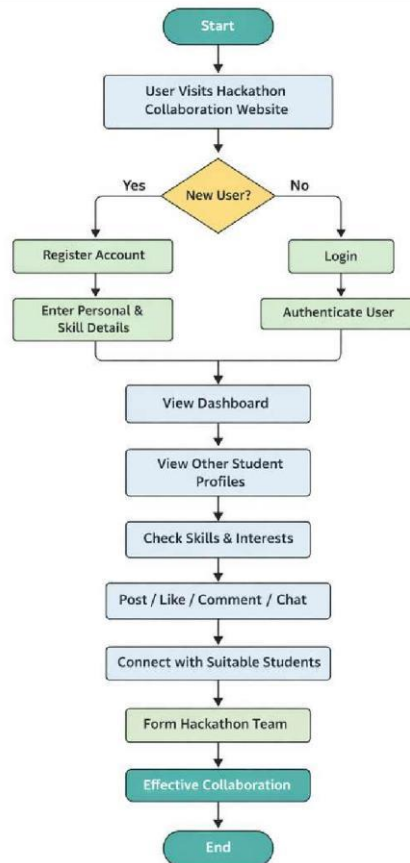
By integrating learning resources, team formation, mentorship, and project management into a single platform, Hack Hub fosters continuous engagement and bridges the gap between theoretical knowledge and practical implementation. The proposed system not only enhances technical skills but also encourages innovation, teamwork, and peer-to-peer learning, thereby preparing students for real-world challenges and professional careers in technology.

### RELATED WORK

In recent years, several platforms have been developed to facilitate student participation in hackathons and collaborative software development. Platforms such as Devfolio and Unstop provide centralized systems for discovering hackathons, forming teams, and submitting projects. Additionally, global organizations like Major League Hacking organize large-scale hackathons and foster innovation among students. However, these platforms primarily focus on large, inter-college events and do not address the need for a localized, college-specific collaboration environment.

At the institutional level, communities such as Google Developer Student Clubs and IEEE student branches encourage technical skill development through workshops, seminars, and hackathons. While these initiatives are valuable, they are often limited to scheduled events and lack continuous engagement, structured project tracking, and centralized digital platforms for collaboration within a college.

Furthermore, tools like GitHub and Discord are widely used for project collaboration and communication. Although powerful, these platforms are generic in nature and not specifically designed for beginner-level students. They lack integrated features such as guided learning paths, mentorship systems, and simplified onboarding tailored to academic environments. To address these limitations, the Hack Hub website developed in this work proposes a unified platform specifically designed for college students. Unlike existing systems, it focuses on creating a centralized ecosystem within a single institution, enabling continuous collaboration, beginner-friendly learning, team formation, and internal hackathon management. This approach bridges the gap between learning and practical implementation while fostering an active and inclusive student developer community.



The proposed system is a web-based hackathon collaboration platform that allows students to connect in a professional and structured way. Users can register, log in, create profiles, add skills, post updates, interact with others, and form teams. The system stores user data securely in a MySQL database and provides real-time interaction through chat and posts. It ensures easy accessibility and efficient collaboration.

### FLOWCHART EXPLANATION

- i. The process starts when a student visits the Hackathon Collaboration Website.
- ii. New users register by entering personal and skill details, while existing users log in.
- iii. After successful login, users access the dashboard.
- iv. Students can view profiles of other users and explore their skills and interests.
- v. The platform allows interaction through posts, likes, comments, and chat.
- vi. Based on interaction and skills, students connect with suitable teammates.
- vii. Teams are formed efficiently, leading to better collaboration in hackathons.

## PROPOSED METHODOLOGY

The development of BCOE HackHub followed a structured and iterative methodology designed to ensure effective planning, user-centered design, and reliable system implementation. The methodology comprised multiple phases: Requirement Analysis, System Design, Implementation, Testing & Refinement, and Deployment [1].

### Requirement Analysis

The first phase focused on identifying the needs and expectations of the target users — students of BCOE who actively participate in hackathons and technical projects. Surveys and informal interviews were conducted to understand their challenges in finding teammates, registering for hackathons, and networking with peers [2]. The collected data was categorized into two groups:

- i. Functional Requirements — including user registration, profile creation, event listing, team formation, messaging, and chat functionalities.
- ii. Non-Functional Requirements — focusing on performance, scalability, usability, and security.

This stage provided a clear understanding of what the system needed to accomplish and established the foundation for subsequent development.

### System Design

The second phase involved designing the system's overall structure and workflow. The design was divided into frontend, backend, and database components to ensure modularity and scalability [3]. The frontend was designed to be visually appealing, responsive, and intuitive, allowing seamless navigation across different sections such as the dashboard, profile management, hackathon listings, and community discussions. Wireframes and mockups were created to visualize key interfaces before implementation. The backend architecture was designed using a modular approach, ensuring flexibility for future updates and integration with external APIs. The database schema was constructed using EntityRelationship (ER) diagrams to define relationships between key entities — including users, teams, hackathons, and posts. This design phase ensured that all system components would interact efficiently, supporting both synchronous and asynchronous communication across modules [4]. This design phase ensured that all system components would interact efficiently, supporting both synchronous and asynchronous communication across modules [4].

### Implementation

In the implementation phase, the system components were developed based on the approved design specifications.

- i. The frontend was implemented using HTML, CSS, and JavaScript for interface and interactivity.
- ii. The backend was developed using PHP, employing

REST-like APIs for client-server communication.

- i. MySQL served as the database, integrated via PDO for secure and efficient data transactions.

During this stage, the chatbot component was integrated into the platform to provide interactive assistance to users. The chatbot was trained to understand student queries, guide them through hackathon listings, and assist with registration or team creation [5].

### Testing and Refinement

Use Case Diagram - Hackathon Collaboration Website

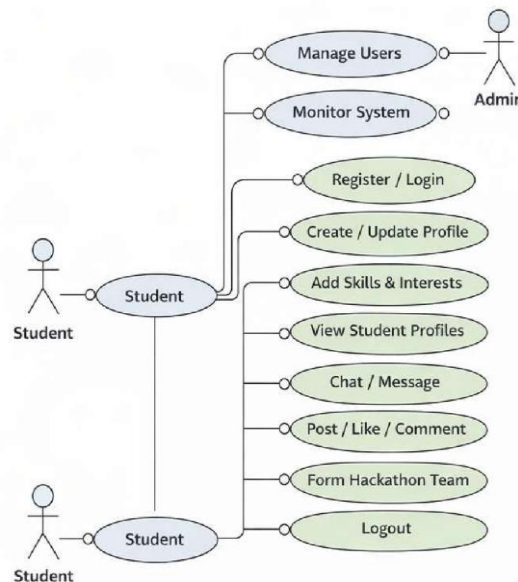


Figure 1: Flowchart of the Proposed Hackathon Collaboration System

After implementation, rigorous testing was conducted to identify defects and validate functionality. A group of BCOE students participated in user testing to evaluate usability and accuracy. The chatbot module underwent multiple test iterations, and the training data and response sets were refined based on user feedback to improve response clarity and accuracy [6]. Both functional testing (for core features) and non-functional testing (for performance, security, and scalability) were carried out. This iterative testing ensured the platform's stability and responsiveness before deployment.

### Workflow of the System

The overall workflow of BCOE HackHub is illustrated in Fig. 03, describing the logical flow between users, system components, and data layers[8]. The Student is the main actor who interacts with the system. Students can register, log in, create profiles, and add skills. They can view other students' profiles and communicate through chat and posts. Based on skills and interests, students can form hackathon teams. The Admin manages users and monitors system activities to ensure proper usage. This diagram shows how different users interact with the system functions.

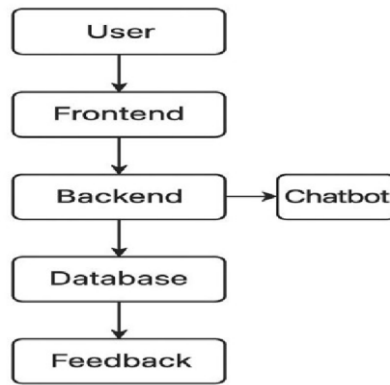


Fig 2: Workflow Diagram of System

### Workflow Description User Interaction

Users access the VIT HackHub platform through a web browser, where they can register, log in, and navigate various features.

#### Frontend Request Handling

The frontend interface (Presentation Layer) sends HTTP or AJAX requests to the backend server when users perform actions such as viewing hackathons, forming teams, or posting updates

#### Backend Processing

The Application Layer (PHP) processes these requests, validates user credentials, and performs business logic operations such as event registration or profile updates.

#### Database Communication

The backend interacts with the MySQL Database Layer to retrieve or store data, using PDO queries for secure communication.

#### Response Delivery

The backend sends the processed data back to the frontend in JSON format. The frontend dynamically updates the interface without reloading the page.

#### Chatbot Integration

The integrated chatbot processes natural language queries using Rasa NLU, providing automated responses and guidance.

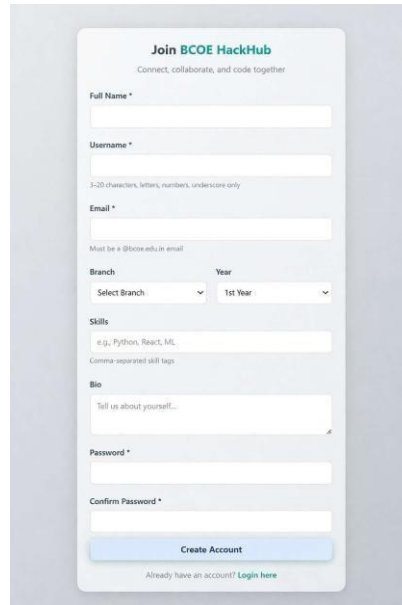
#### User Feedback & Continuous Improvement

Based on real-time monitoring and user feedback, chatbot responses and platform functionalities are refined and improved.

### STEPS

1. Start
2. User visits the hackathon collaboration website 3.
  - Decision: Is the user new?      o      Yes (New User):
    1. Register an account
    2. Enter personal and skill details
  - o No (Existing User):
    1. Login
    2. Authenticate user
4. View dashboard
5. View other student profiles
6. Check skills and interests
7. Interact with others o      Post o Like o
  - Comment o      Chat
8. Connect with suitable students
9. Form hackathon team
10. Achieve effective collaboration
11. End

## RESULTS



The image shows a registration form titled "Join BCOE HackHub" with the tagline "Connect, collaborate, and code together". The form includes fields for Full Name, Username (with a note: "3-20 characters, letters, numbers, underscore only"), Email (with a note: "Must be a @bcoe.edu.in email"), Branch (dropdown menu), Year (dropdown menu), Skills (with an example: "e.g., Python, React, ML" and a note: "Comma-separated skill tags"), Bio (with a prompt: "Tell us about yourself..."), Password, and Confirm Password. A "Create Account" button is at the bottom, and a link for "Already have an account? Login here" is below it.

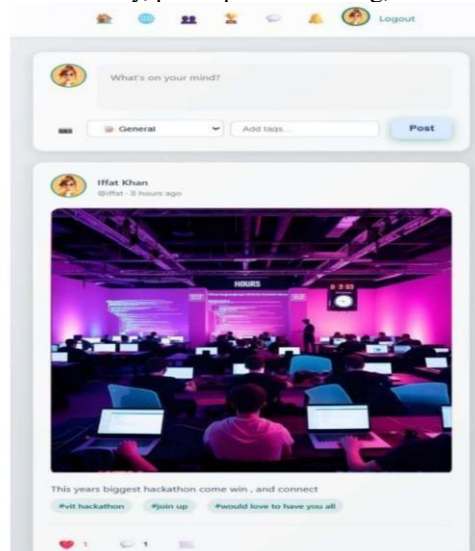
The image illustrates a user registration interface for a webbased platform named BCOE HackHub, designed to facilitate student collaboration in hackathons. The form collects essential user information, including full name, username, institutional email address, academic branch, and year of study.

Additionally, users are required to specify their technical skills and provide a brief personal biography to support profile-based matchmaking.

The interface enforces input validation constraints, such as username format requirements and the use of a valid institutional email domain. Security is ensured through password creation and confirmation fields. Upon successful data entry, users can create an account via the submission button, while existing users are provided with a navigation option to log in.



The image represents a hackathon listing dashboard within the BCOE HackHub platform. It provides users with an interface to explore and participate in available hackathons. Each listing displays key details such as the hackathon title, date, domain (e.g., AI/ML), mode of participation (online or on-campus), description, number of participants, and organizer information. The interface also includes interactive features such as the ability to join or leave events and an option to post new hackathons. This module enhances user engagement by enabling event discovery, participation tracking, and collaboration opportunities within the platform.



The image depicts a social networking platform interface featuring a user-generated post. At the top, there is a content creation section with options for category selection and tagging. Below, a post by a user showcases a photograph of a large-scale hackathon event, where numerous participants are seated in a conference hall working on laptops under vibrant purple lighting. The post includes a caption promoting the event along with relevant hashtags. Overall, the image illustrates how social media platforms facilitate the promotion of technology events and community engagement.

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