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# "Survey on AlumniConnect Enhancing Alumni-Student Interaction Platforms"

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**Abstract**: The lack of structured interaction between alumni and students has long hindered the development of academic and professional networks in higher education. This paper surveys recent advancements in digital platforms designed to bridge this gap, with a particular focus on Alumni-Student Interaction Platforms (ASIPs). These systems aim to facilitate mentorship, career guidance, job sharing, and collaborative learning through integrated tools like online code compilers, discussion forums, and real-time messaging. The paper critically examines the architecture, features, and implementation challenges of such platforms, highlighting the importance of engagement, scalability, and data privacy. With technologies like React.js, Node.js, and Firebase becoming mainstream, these platforms now have the potential to become central hubs for academic communities.

**Keywords:** Alumni Interaction, Mentorship Platforms, Career Guidance, Web Development, Real-Time Communication, React.js, Node.js, Firebase, Networking Systems.

## I. INTRODUCTION

Alumni play a crucial role in shaping the academic and professional growth of students through mentorship, knowledge sharing, and networking. However, most educational institutions lack a centralized, structured platform to facilitate these interactions effectively. Informal communication channels such as social media groups and occasional alumni events often fail to create sustained engagement or purposeful connections between alumni and current students.

In today's digital-first world, there is a growing need for institutions to adopt scalable and interactive platforms that can bridge this gap. Alumni-Student Interaction Platforms (ASIPs) aim to provide this structure by offering features such as one-on-one mentorship sessions, job and internship boards, discussion forums, and collaborative tools like online code compilers. These systems not only enhance student learning and career prospects but also strengthen the institution's network and long-term community engagement.

This paper presents a survey of the current landscape of ASIPs, highlighting the technological components, common features, challenges in implementation, and best practices. It also introduces *AlumniConnect*, a web-based system developed to address these needs, focusing on career guidance, real-time communication, and alumni-driven opportunity sharing.

# II. LITERATURE SURVEY

Alumni engagement has traditionally been limited to sporadic reunions, mailing lists, or unstructured social media groups. While these methods offer basic interaction, they lack the tools required for structured mentorship, career support, or collaborative learning. Over the last decade, with the rise of digital transformation in education, a variety of platforms and research efforts have attempted to bridge this gap by introducing more formalized Alumni-Student Interaction Platforms (ASIPs).

## **Traditional Approaches and Limitations**

Conventional methods such as newsletters, alumni magazines, and email-based communication systems provide limited scope for interaction. They are largely one-directional and fail to support real-time engagement, user profiling, or activity tracking. Social media platforms like LinkedIn and Facebook, although useful for networking, are not designed to support institution-specific goals like guided mentorship, job pipelines, or code-based collaboration.



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#### **Commercial Platforms**

Several commercial solutions such as *Graduway*, *PeopleGrove*, and *Almabase* have emerged to fill this void. These platforms offer features like alumni directories, event management, fundraising, and career services. However, they are often expensive, require subscriptions, and lack the flexibility for institutions to customize features based on local needs, cultural expectations, or technical constraints. Furthermore, they rarely support student-driven technical collaboration or real-time mentoring tools like integrated chat or code editors.

#### Academic and Open-Source Initiatives

A number of academic projects and open-source solutions have also explored the development of alumni portals tailored for educational institutions. These systems often use modern web stacks such as MERN (MongoDB, Express.js, React.js, Node.js) or serverless architectures like Firebase for rapid deployment. Research has emphasized the importance of rolebased access control, secure authentication, and scalable backend systems to manage dynamic content like job listings, messages, and forum discussions.

#### **Need for Student-Centric Features**

Most existing platforms focus heavily on alumni and administrative use cases (e.g., donations, event invitations), often neglecting features that support students directly. There is a growing need for platforms that include modules such as:

- Mentorship scheduling
- Job/internship posting by alumni
- Discussion forums
- Live code collaboration tools

These features enhance the relevance of the platform for students and increase the likelihood of long-term engagement from both ends.

#### **Technological Gaps and Challenges**

Despite the availability of advanced technologies, challenges remain in implementing ASIPs effectively. These include ensuring data privacy, maintaining user engagement, scaling for large institutions, and integrating mobile accessibility. Additionally, most platforms lack personalization and AI-driven recommendations for mentor-student matching, which could enhance the quality of interactions.

#### III. OBJECTIVES

The primary aim of an Alumni-Student Interaction Platform is to foster meaningful engagement, mentorship, and professional development opportunities. The specific objectives of such a system are as follows:

- A. To build a centralized digital platform that bridges the gap between alumni and students by enabling structured communication and collaboration.
- B. To facilitate one-on-one mentorship sessions, career guidance, and knowledge sharing through secure and accessible interaction modules.
- C. To allow alumni to contribute actively to student development by posting job openings, internships, and professional opportunities.
- D. To provide technical collaboration tools, such as an integrated code compiler and discussion forums, promoting skillbuilding and peer learning.
- E. To ensure secure user management through role-based authentication, profile validation, and data privacy measures.
- F. To support scalability, user engagement, and long-term sustainability through modular design and cloud-based technologies.

#### IV. METHODOLOGY

The development of an effective Alumni-Student Interaction Platform (ASIP) requires a methodical approach that combines modern software engineering practices with user-centered design principles. The following methodology outlines the key stages in the conceptualization, design, development, and testing of the *AlumniConnect* system.

#### A. Requirement Analysis and Planning

The initial phase involved identifying the key needs of both alumni and students through informal surveys, faculty guidance, and observation of current engagement limitations. The following core requirements were established:



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- Seamless user registration and role-based access (student/alumni/admin)
- Real-time communication and mentorship features
- A centralized job and internship board
- Knowledge-sharing spaces like discussion forums and collaborative tools

#### **B.** System Design and Architecture

The platform was designed using a modular architecture to ensure scalability and maintainability. The main components include:

- **Frontend:** Developed using **React.js**, providing a dynamic and responsive user interface with a clean dashboard layout.
- Backend: Powered by Node.js and Express.js, managing APIs, authentication logic, and data handling.
- **Database: Firebase** was used for real-time data management, user authentication, and secure storage of user profiles, posts, and messages.
- Communication Module: Chat system powered by Firebase's Firestore and WebSocket-like real-time listeners.

A RESTful API model was followed to facilitate data flow between frontend and backend services, allowing seamless integration and future expansion.

#### **C. Core Functional Modules**

The platform consists of several key modules:

- 1. Authentication and User Roles:
- a. Secure login/signup with Firebase Auth
- b. Role-based dashboard views for alumni, students, and administrators
- 2. Profile Management:
- a. Users can update professional, academic, and contact information
- b. Filterable alumni directory based on industry/domain
- 3. Mentorship and Messaging:
- a. One-to-one direct messaging between students and alumni
- b. Option to schedule mentorship sessions
- 4. Job and Internship Board:
- a. Alumni can post job openings or internships
- b. Students can browse and apply directly from their dashboard
- 5. Discussion Forums:
- a. Threaded discussions for academic, career, or technical topics
- b. Allows students to raise queries and alumni to respond
- 6. Online Code Compiler (Optional Add-On):
- a. Real-time code execution using third-party API (like Judge0)
- b. Supports collaborative learning in technical subjects

#### **D.** Tools and Technologies Used

Layer	Tools / Technologies
Frontend	React.js, HTML5, CSS3, Tailwind CSS
Backend	Node.js, Express.js
Database	Firebase Realtime DB / Firestore
Authentication	Firebase Authentication (OAuth 2.0)
API Testing	Postman
Development Tools	Visual Studio Code, GitHub, Firebase Hosting

#### E. Testing and Validation

The platform underwent multiple rounds of testing:

- Unit Testing: Each module (e.g., login, post creation) was tested in isolation.
- **Integration Testing:** Ensured smooth communication between frontend, backend, and database.

• User Testing: A pilot trial was conducted with a group of students and alumni for usability feedback and improvements.

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Key metrics included:

- Page load speed
- Authentication response time
- Successful post/message delivery
- Data accuracy in user profiles and job boards

#### F. Deployment and Hosting

The application was deployed using **Firebase Hosting**, which offers fast content delivery, HTTPS security, and scalability. Version control was maintained via GitHub for collaborative development and easy rollback during testing.

#### G. Scalability and Future Expansion

The system architecture supports future enhancements such as:

- AI-based mentor recommendations
- Analytics dashboard for engagement tracking
- Mobile app version (React Native)
- Admin analytics to monitor usage patterns and content quality



#### V. APPLICATION REQUIREMENTS

To successfully develop and deploy the *AlumniConnect* platform, certain hardware and software requirements must be fulfilled. These requirements ensure the system performs efficiently during development, testing, and production deployment, while also supporting modern web features such as real-time updates, secure authentication, and responsive design.

#### A. Hardware Requirements

The development of the platform requires a modern computing setup with adequate resources to handle full-stack development and real-time testing. A computer with at least an Intel Core i5 (8th Generation or above) or AMD Ryzen 5 processor is recommended for smooth performance. The system should have a minimum of 8 GB RAM, although 16 GB is preferred to ensure seamless multitasking, especially when running both backend servers and frontend build tools simultaneously. Storage should be SSD-based with at least 256 GB capacity to accommodate source code, dependencies, and version control repositories efficiently. A stable internet connection with a minimum speed of 20 Mbps is necessary to enable real-time data syncing, Firebase integration, and cloud-based deployment.

#### **B.** Software Requirements

From a software perspective, the development of *AlumniConnect* involves both frontend and backend technologies. The frontend is developed using React.js, a popular JavaScript library that facilitates the creation of dynamic, single-page user interfaces. Standard web technologies such as HTML5 and CSS3 are used in combination with styling frameworks like Tailwind CSS or Bootstrap to ensure responsive design and mobile compatibility.

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The backend is built using Node.js along with the Express.js framework, enabling the development of RESTful APIs for handling requests, responses, and interactions with the database. Firebase is used as the primary database solution, offering real-time data synchronization, secure user authentication, and scalable cloud storage. Alternatively, relational databases like MySQL or PostgreSQL can be used if structured data handling is prioritized.

For user authentication, Firebase Authentication is integrated to manage secure sign-in methods including email/password as well as OAuth-based login such as Google Sign-In. This allows for robust access control and role management between students, alumni, and administrators.

The development process makes use of tools such as Visual Studio Code for code editing, Postman for API testing, and Git with GitHub for version control and team collaboration. The Node Package Manager (npm) is used to install and manage project dependencies and third-party libraries.

#### **C. Deployment Environment**

The application is deployed using Firebase Hosting, which offers fast global delivery through a content delivery network (CDN), automatic HTTPS, and simple deployment commands via the Firebase CLI. For projects requiring a full-stack deployment, platforms such as Heroku, Render, or Vercel can be considered to host both frontend and backend services seamlessly.

#### **D.** Optional Integrations

To enhance the functionality of the platform, several optional integrations can be included. These include Judge0 API or JDoodle for embedding a live code compiler, SendGrid or Mailgun for email notifications, and Google Calendar API for scheduling mentorship sessions. For analytics and monitoring, Firebase Analytics or Google Analytics can be used to track user engagement and platform performance.

#### VI. CHALLENGES

Developing an interactive and scalable Alumni-Student Interaction Platform like *AlumniConnect* is a promising but complex task. It goes beyond coding and architecture to address human behavior, privacy laws, community management, and long-term sustainability. The major challenges observed and anticipated are discussed below.

#### A. Ensuring Active Participation and Engagement

A primary challenge lies in motivating both students and alumni to actively use the platform. Alumni, who are often preoccupied with their professional lives, may not see immediate benefits in returning to engage with the institution or mentor students. On the other hand, students may lack awareness about the value of networking and mentorship. Without regular interaction from both ends, the platform risks becoming inactive, regardless of its features.

#### B. Data Privacy, Security, and Trust

Since the platform collects and stores personal information, including academic records, professional details, and private messages, ensuring strong data privacy and security protocols is critical. A breach of trust through poor data handling practices could result in legal issues, reputational damage, and loss of user confidence. Role-based access control, encrypted communications, and secure authentication systems must be enforced to protect all users.

#### C. Scalability and Real-Time Performance

As the user base grows, the platform must be able to handle increasing volumes of data and concurrent users—especially during peak times like placement seasons or event announcements. Real-time messaging, dynamic job boards, and notification systems need to remain fast and responsive. This demands efficient backend design, database optimization, and, potentially, cloud-based load balancing mechanisms.

#### **D.** Balancing Feature Complexity with Usability

It is tempting to include numerous features such as job boards, forums, code editors, and chat systems. However, overloading the platform can lead to a cluttered user experience, especially for non-technical users like some alumni. The challenge lies in offering meaningful functionality while maintaining a simple, intuitive interface that caters to a diverse audience across age groups and technical backgrounds.

#### E. Moderation, Content Management, and Spam Control

As users begin to generate content—discussion posts, job listings, or messages—moderation becomes necessary to prevent misuse, spam, or inappropriate behavior. Without adequate monitoring and reporting mechanisms, the platform may risk being used for non-academic purposes, ultimately reducing its credibility. A well-defined moderation policy and admin dashboard must be in place to handle such scenarios.



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#### F. Long-Term Maintenance and Institutional Support

Beyond the development phase, the platform requires consistent maintenance, updates, and support. This includes fixing bugs, updating libraries, adding new features based on feedback, and ensuring compatibility with changing browser or server standards. A sustainable model needs to be proposed where the institution or alumni association takes ownership of ongoing support, or a student team is continuously trained to manage it.

#### VII. CONCLUSION

The growing importance of alumni networks in shaping students' academic and professional lives is undeniable. Platforms like *AlumniConnect* are designed to bridge this gap by offering a centralized, interactive, and scalable solution for alumni-student engagement. This paper surveyed the essential components of such a platform—from real-time communication and mentorship tools to job postings and discussion forums—framing them within a well-structured, modern web-based architecture.

The platform aims to bring structure to a largely informal process, ensuring that students benefit from the experience and networks of alumni while giving alumni a way to stay connected and contribute to their alma mater. By utilizing technologies like React.js, Node.js, and Firebase, *AlumniConnect* not only simplifies development but also ensures real-time performance, ease of deployment, and cross-platform compatibility.

Despite the platform's promise, several challenges remain. Sustaining user engagement, ensuring data security, scaling the infrastructure, and maintaining long-term institutional support are issues that need to be tackled through thoughtful design and planning. User behavior, especially in academic ecosystems, is unpredictable and requires ongoing efforts in communication, incentivization, and technical support.

Looking ahead, platforms like *AlumniConnect* can evolve to include smart features such as AI-driven mentor matching, skill-based career recommendations, and analytics dashboards for tracking impact. With the right vision, institutional support, and iterative improvement, such platforms can significantly improve the quality of career guidance, mentorship, and networking available to students, while also strengthening the bond between alumni and their institutions.

Ultimately, *AlumniConnect* is more than just a technical project—it represents a step toward building a stronger, more connected academic community that thrives on mutual support and shared growth.

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