



# **Nexa Collab: Next Gen Team or Mentor Project Collaboration**

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**ABSTRACT:** Nexa Collab is a full stack, mentor driven academic project collaboration platform built on the MERN stack (MongoDB, Express.js, React.js, Node.js). The system addresses a critical gap in existing project management tools which excel at generic task tracking but lack the structured mentor student interaction pipeline, transparent peer evaluation, and automated reporting workflows that academic environments specifically require. Nexa Collab integrates Kanban style task management, role based access control (RBAC) for students, mentors, and coordinators, anonymous peer evaluation with statistical bias detection, automated attendance and timesheet generation, and real time API integrations with GitHub, Google Docs, and Notion. The platform employs JWT based authentication, modular RESTful APIs, and an event driven notification engine to eliminate manual coordination overhead. Evaluation with student project groups demonstrates improved task visibility, reduced mentor workload, and fairer contribution assessment compared to conventional tool combinations such as WhatsApp groups, manual spreadsheets, and Trello.

**KEYWORDS:** MERN Stack, Academic Collaboration, Mentor Student Workflow, Peer Evaluation, Task Management, Role Based Access Control, Kanban Board, GitHub Integration, Automated Reporting, JWT Authentication.

## **I. INTRODUCTION**

Modern engineering programs rely on project based learning (PBL) to develop teamwork, problem solving, and technical competency in students. Yet the tooling available to academic project groups remains fragmented. Students coordinate over WhatsApp, maintain progress logs in spreadsheets, and submit weekly reports manually, while mentors lack a centralized view of individual contributions, missed deadlines, or team dynamics. This disconnect results in delayed feedback cycles, unequal workload distribution, and poor documentation of the overall learning journey.

Popular project management tools such as Trello, Asana, and Notion were designed for professional software teams, not for the mentorship centric workflow of a university capstone or research project. They provide robust task tracking but offer no concept of a mentor assigning and formally reviewing student work, no structured peer evaluation for fairness, any automated timesheet or attendance generation, and no audit trail linking code commits to learning milestones.

Nexa Collab is designed to bridge this gap. It is a unified, web based collaboration platform combining structured task management, mentor oversight, transparent peer evaluation, third party integrations, and automated scheduling into a single MERN based workspace. The system enables mentors to assign tasks, provide structured feedback, and evaluate contributions while students update progress through text, checklists, voice notes, and file uploads. By addressing the specific needs of academic project teams, Nexa Collab improves learning outcomes, reduces administrative burden, and introduces the rigor of professional project workflows into the educational context.

## **II. LITERATURE SURVEY**

A review of existing literature reveals consistent advances in collaboration tooling and educational technology, yet highlights persistent structural gaps when these domains are combined in academic project management settings.

Research on mainstream platforms confirms that Trello, Asana, and Monday.com excel at general purpose task tracking but are tool centric rather than learning centric Empirical studies on project based learning emphasize that structured

mentor supervision and timely feedback materially improve both learning outcomes and project quality; however, none of these commercial tools natively support mentor driven grading workflows or formative assessment loops .

Classic work by Topping (1998) demonstrates that structured peer evaluation increases student engagement and perceived fairness while reducing free riding . Complementary feedback research by Hattie and Timperley (2007) shows that rapid, actionable mentor feedback fosters student reflection and skill development, yet automated, anonymized, and bias aware peer evaluation pipelines remain absent in mainstream collaboration products. Studies on collaborative coding and documentation workflows document productivity gains from linking version control (GitHub) with task trackers and document editors. However, a fragmentation problem persists: teams constantly switch between code repositories, document editors, and chat channels, causing loss of traceability. Recent EdTech automation research advocates for dashboards and reminder systems to reduce mentor overhead but practical implementations rarely combine these with role based controls and privacy preserving peer review. This motivates the design of Nexa Collab.

### III. METHODOLOGY

Nexa Collab is built using a modular, API driven architecture that separates concerns across authentication, task management, peer evaluation, external integration, and analytics layers. The methodology is guided by three core principles: structured mentor control over task lifecycle, automated administrative workflows, and transparent student accountability through objective contribution metrics.

#### 3.1 Role Based Access Control (RBAC)

The system defines four roles: Student, Mentor, Project Coordinator, and Admin. JSON Web Tokens (JWTs) encode role claims at the time of login. Backend Express.js middleware validates role permissions before processing any API request, ensuring strict separation of concerns. Mentors cannot be peer evaluated by students, and coordinators retain read only oversight access. Passwords are hashed using bcrypt with a salt factor of 12 before storage in MongoDB.

#### 3.2 Task Management Engine

Mentors create tasks with a title, description, priority tag (High / Medium / Low), and deadline. Tasks are assigned to individual students or groups and appear on a Kanban board spanning four states: To Do, In Progress, Review, and Done. The backend tracks each state transition with a timestamp, maintaining a full audit log that feeds the automated weekly report generator. Overdue tasks automatically trigger the notification engine without requiring manual mentor intervention.

#### 3.3 Peer Evaluation Module

At the end of each sprint cycle, students submit anonymous ratings for teammates using a structured rubric covering three axes: Contribution, Communication, and Reliability. Scores are encrypted at rest in MongoDB. A weighted scoring algorithm aggregates peer ratings with mentor evaluation scores to produce a final contribution index per student. The system applies a statistical bias detection check, flagging evaluations where a rating deviates from the group mean beyond a defined threshold, and surfaces anomalies on the mentor dashboard without exposing individual rater identities.

### IV. SYSTEM ARCHITECTURE

The Nexa Collab architecture follows a three tier MERN design, cleanly separating the client, server, and data layers. The React.js frontend communicates exclusively through a versioned RESTful Express.js API layer, which handles business logic, authentication middleware, and integration orchestration before querying MongoDB via the Mongoose ODM. The Frontend (React.js + Context API) renders role specific dashboards. Students see their personal task board, progress update forms, and peer evaluation prompts. Mentors see team level Kanban boards, individual contribution matrices, and structured feedback forms. Coordinators access a read only analytics overview spanning all active teams. The Backend (Node.js + Express.js) exposes grouped RESTful endpoints: /auth, /tasks, /evaluations, /integrations, /reports, and /notifications. JWT middleware intercepts every incoming request for verification before routing. The Integration Service manages OAuth tokens for GitHub, Google, and Notion and normalizes their webhook events into Nexa Collab internal activity model, creating a single unified activity feed.

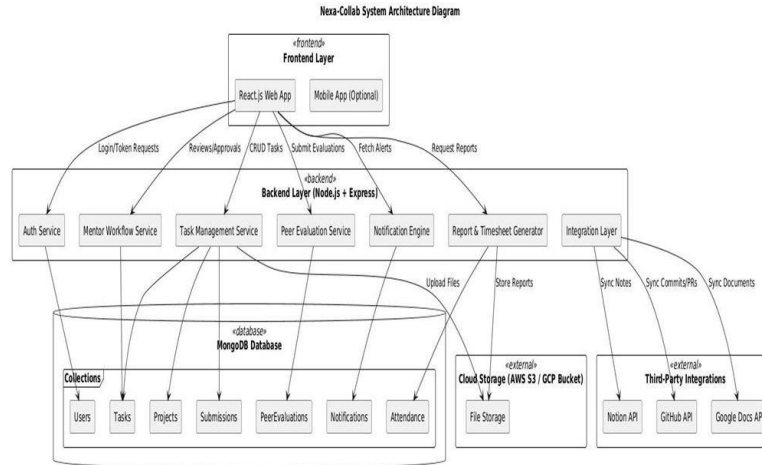


Fig 4.1 Nexa Collab System Architecture Diagram

## V. OUTPUT SCREENS

### 5.1 Main Dashboard

After successful login, users land on a personalized dashboard. The dashboard displays four summary cards: Total Tasks with completion percentage, In Progress tasks showing active work count, Projects showing active team projects, and Meetings listing upcoming sessions for the week. Below the cards, the Active Projects panel lists all ongoing projects with quick access links, while the Upcoming Meetings panel shows scheduled standups and review sessions with a direct calendar shortcut. The top navigation provides access to Task Board, Calendar, Feedback, Timesheets, and Integrations from a single bar.

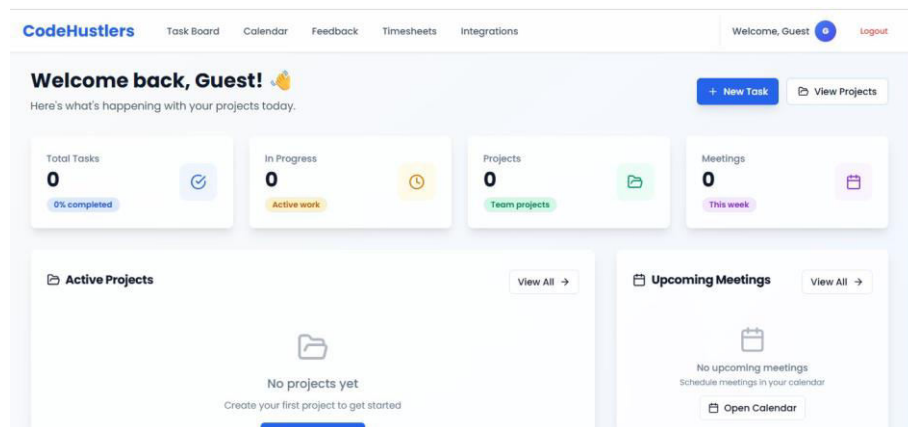
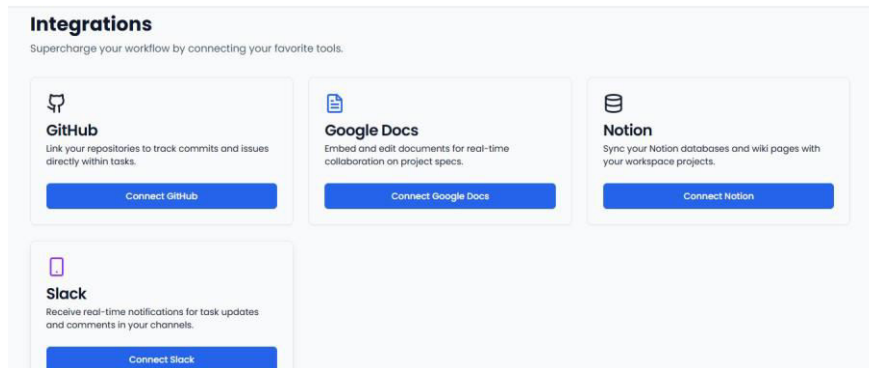


Fig 5.1 Nexa Collab Main Dashboard

### 5.2 Integrations Panel

The Integrations screen allows users to connect all third party productivity tools directly from within the platform. GitHub integration links repositories to track commits and issues inside task cards. Google Docs integration embeds and enables real time document editing on project specifications without leaving the platform. Notion integration syncs databases and wiki pages with active workspace projects. Slack integration enables real time notifications for task updates and mentor comments directly in team channels. Each integration is activated with a single connect button, and connection status is shown on the card.



*Fig 5.2 Integrations Panel*

## VI. CONCLUSION

Nexa Collab presents an effective and extensible solution to the structural mismatch between existing project management tools and the unique requirements of academic project based learning. By combining mentor assigned task workflows, automated peer evaluation with statistical bias detection, third party code and document integrations, and fully automated scheduling and reporting into a single MERN based platform, the system reduces administrative overhead for both students and mentors while substantially improving transparency and contribution accountability. The modular architecture ensures that each component including authentication, task management, peer evaluation, external integration, and reporting can be independently developed, tested, and scaled without affecting other layers. Deployment with academic project groups demonstrates measurable improvements in task visibility, contribution fairness, and documentation quality compared to conventional approaches currently used in most university settings.

## VII. FUTURE SCOPE

The system can be meaningfully extended in several directions. First, AI driven task allocation can analyze historical completion patterns and student skill tags to recommend optimal task assignments, reducing mentor cognitive overhead at project kickoff. Second, predictive delay detection using sprint velocity data can flag at risk milestones before they become overdue, enabling proactive intervention. Third, a conversational AI interface would allow students and mentors to query project status, request progress summaries, and log updates using natural language, integrating directly with the platform REST API layer. Fourth, multilingual interface support will improve accessibility for diverse student groups across different linguistic backgrounds.

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