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Online Portal for Tracking and Managing Student Projects

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Abstract - *Online Portal for Student Project Tracking and Management is a web application that can be used to simplify the management and tracking of student projects in schools. This system is meant to offer a simple platform in which students and instructors can administer their respective duties and track student project progress. The portal offers functionalities such as project allocation, tracking of status, resource allocation, task management, and feedback submission. The system also facilitates online collaboration among students and instructors to ensure proper communication and timely completion of projects. The portal facilitates multiple projects working in parallel with students uploading the project information, establishing milestones, and getting proper feedback from the instructors. Faculty members can create tasks, monitor progress, and offer proper direction, while getting access to extensive reports on students' performance as well as the status of projects. The system is designed with emphasis on usability, effective project tracking, and enhancing the overall productivity of students and teachers alike.*

With the use of advanced web technologies like MongoDB, Express.js, Vue.js, and Node.js, the portal is designed to deliver high performance, scalability, and security. This project seeks to enhance the process of project management in educational institutions and businesses by offering a centralized platform for project tracking, resource management, and collaboration

Key Words: *Online Portal, Project Management, Student Projects, Task Management, Real-time Collaboration, Faculty, MongoDB, Express.js, Vue.js, Node.js*

1.INTRODUCTION

In contemporary academia, student project management is an imperative but demanding job. Faculty struggle to monitor progress on numerous student projects simultaneously, meet deadlines, and offer appropriate support to students. Conventional project management like paper records or manual tracking is inefficient in incorporating dynamic efficiency and real-time communication required for effective coordination. This creates inefficiencies, delays, and disarray, both among students and faculty.

To overcome such challenges, an Online Portal for Monitoring and Managing Student Projects has been created to automate project submission, tracking of progress, and collaboration between faculty and students using state-of-the-art web technologies. The system encompasses multiple functionalities like real-time updates, formal feedback mechanisms, and easy-to-use interface to foster productivity in the management of academic projects.

The adoption of a digital solution not only guarantees smooth communication but also decreases administrative burden, increases transparency, and encourages accountability in student project management. Utilizing advanced technologies, the portal provides an organized and effective means of tracking project progress, keeping records, and enabling constructive feedback among students and faculty members.

1.1 Problem Statement

In an educational institution, information is scattered across systems leading to lack of real-time updates and communication gap between students and faculty. Many faculty members may also find it challenging to allocate tasks, keep track of projects, and assess students on time, etc. So, the students might struggle with very exact project requirements, deadlines, and their needs. Central to several of these issues is the need for an integrated system allowing for efficient project management and transparent communication.

1.2 Objective

The key aim of the Online Portal for Tracking and Managing Student Projects is to efficiently and optimally manage the projects of all pupils and faculty through a unified portal. The system aims to:

- Give students the ability to enter the details of their project, determine milestones, and track progress.
- Allow for task assignment, project status tracking and reporting, and feedback from faculty members.

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- A student-faculty messaging platform with real-time notifications.
- Improvement of time & efficiency of project management process within educational institutions.

2. METHODOLOGY

In order to meet the above goals, the project uses a structured methodology broken down into various main phases. Each of these is intended to develop upon the last, resulting in a strong and scalable solution. The system development uses a formal Software Development Life Cycle (SDLC) methodology with the following main phases:

2.1 Requirements Gathering

A thorough requirements analysis was performed to validate that the system satisfies the requirements of students, faculty, and administrators. The process included:

Stakeholder Interviews and Surveys: Interviews were conducted with faculty members and students to determine typical challenges in project tracking.

Analysis of Existing Systems: Examined conventional project tracking practices and available software tools to determine shortcomings and gaps.

User Requirement Documentation: Prepared detailed documentation of the functional and non-functional requirements of the system.

2.2 User Interface (UI) and User Experience (UX) Design:

Created wireframes and prototypes using Figma.

Ensured easy-to-use interface with minimalistic navigation and ease of access. Implemented a responsive design for multi-device compatibility with desktop and mobile devices.

2.3 System Architecture:

The system architecture is based on a MEVN stack, with:

MongoDB (Database Layer): A NoSQL database where student records, project information, and faculty comments are stored.

Express.js (Backend Layer): Takes care of API requests, authentication, and business rules.

Vue.js (Frontend Layer): Offers a dynamic and interactive user interface for the students and the faculty.

Node.js (Server Layer): Is responsible for server-side operations and API interactions.

2.4 Database Design

A MongoDB Atlas NoSQL schema was implemented in order to effectively store and manage data related to projects. The important collections are:

Collection Name	Purpose
Users	Stores student, faculty, and admin details with role-based access control.
Projects	Contains project details, milestones, deadlines, and statuses.
Tasks	Manages assigned tasks, progress updates, and deadlines.
Feedback	Stores faculty feedback and student responses.
Notifications	Handles real-time alerts for project updates and task assignments.

Table -1: Database Design

2.5 Development

The development process was modular in nature, allowing independent components to be tested and deployed individually. The steps were:

1.Frontend Development:

Implemented the student and faculty dashboards using Vue.js.Implemented responsive design principles for cross-platform compatibility. Used to implement state management through Vuex to handle data efficiently.

2.Backend Development:

Created a RESTful API with Express.js.Added authentication and authorization through JWT (JSON Web Tokens).Set up API endpoints for managing user roles, projects, and tasks.

3.Real-Time Features:

Used WebSocket to achieve real-time project progress updates and notifications. Created an in-app chat feature to communicate with faculty and students.

4.File Management:

Allowed uploading of documents for project files using Multer middleware. Set up cloud storage through AWS S3 for secure file management.

2.6 Testing

A robust testing approach was adopted to make sure the system operates efficiently and smoothly. Unit Testing tests each module (backend, frontend, database) individually. Applied Jest and Mocha for backend API. Testing for Integration to verify that the database, backend, and frontend are all communicating with each other correctly. Role-based access and authentication flow were tested.

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Faculty and students participated in User Acceptance Testing (UAT) and provided input. improved system navigation and a polished user interface based on user input. Evaluation of Performance is done to demonstrate scalability; several users were simulated simultaneously and also to check enhanced API response speeds to guarantee rapid system operation. Environment for Deployment are Heroku/AWS was used for cloud-based deployment. Using containerized deployment with Docker. Use GitHub Actions to set up CI/CD processes. Winston and Morgan were used to implement log monitoring. Set up automated backups to protect the database. Planned recurring system upgrades to enhance functionality. Security was given topmost consideration in development. The system utilizes Role-Based Access Control (RBAC) such as Admins, students, and teachers have varying levels of access permissions. Sensitive data is encrypted with bcrypt and AES encryption. Utilized JWT tokens for session management. Utilized helmet.js to implement security-related HTTP headers. Avoided SQL injection and XSS attacks using sanitization libraries. Following initial deployment, ongoing feedback from students and faculty was collected to refine the system. Enhanced dashboard layout for ease of use. Minimized load times through database query optimization. Included project archiving for finished projects.

Figure 1 – Database Design

3. PROPOSED WORK MODULE

The goal of the Online Portal for Tracking and Managing Student Projects is to give instructors and students a single location to effectively organize, monitor, and work together on academic assignments. The system guarantees open communication and organized project management by incorporating functions like work assignment, project submission, real-time progress monitoring, and feedback creation. There are several modules in the system. Students can manage assigned assignments, submit project information, monitor progress using a visual timeline, and get comments directly from faculty members using the Student Module. Faculty members can supervise student projects, set deadlines for assignments, assess progress, and create performance reports with the Faculty Module. Data integrity management, system performance monitoring, and user management are all included in the Admin Module's features.

The MEVN stack is used to build the System Architecture, which includes Express.js for backend services, Vue.js for an intuitive frontend, Node.js for effective server-side operations, and MongoDB for database management. Future improvements are made possible by the secure, scalable, and modular design. Where students enter project details, faculty assign tasks and monitor progress, students update milestones and finish tasks, faculty offer feedback, and administrators oversee system operations, the Functional Flow guarantees an easy-to-use user experience.

Real-time notifications for immediate updates, customized dashboards that show tasks and milestones, and scalability to support numerous users and projects are some of the system's primary features. With two-factor authentication, role-based access control, and encrypted communication, the system places a high priority on security. While Task and Milestone Management enables professors to track progress and students to establish deadlines, a User-Friendly Interface guarantees simple device navigation. The system also facilitates real-time collaboration by providing tools for debate and feedback, as well as customizable reports and analytics for monitoring project bottlenecks and performance trends.

The system incorporates a Privacy Policy that outlines data collecting and storage procedures, as well as Terms and Conditions that outline user duties and service limits, in order to ensure compliance with industry standards. Data security is guaranteed by legal compliance with GDPR and IT Act laws, while User Consent Management necessitates acceptance of terms prior to portal use. Reduced manual labor will increase efficiency, real-time feedback will improve communication, structured progress monitoring will raise transparency, and extensive user and system management tools will simplify administration

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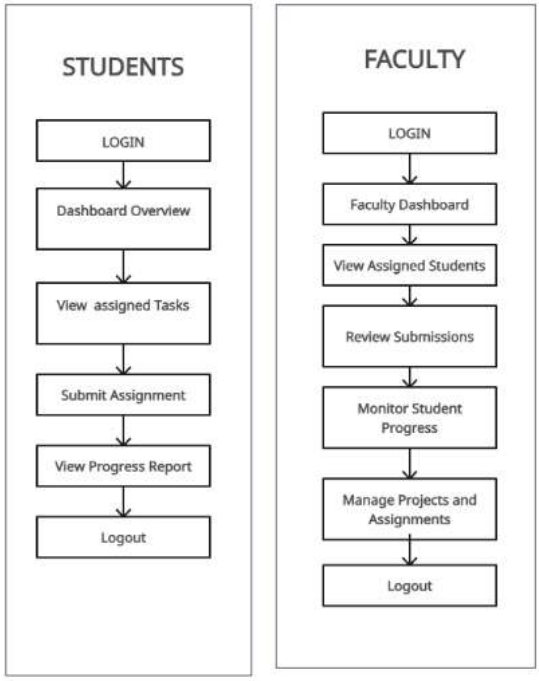

Figure 2 – Workflow Overview

4. RESULTS AND DISCUSSION

The Online Portal for Tracking and Managing Student Projects was successfully implemented and evaluated across various performance criteria, including functionality, scalability, user experience, and its impact on project management in academic institutions. The results highlight that the system significantly enhances project submission, progress tracking, and faculty-student collaboration. To ensure its effectiveness, the system was tested using three key evaluation methods: Functional Testing, which ensured that all system features operated as expected; Performance Analysis, which measured response times, scalability, and overall efficiency; and User Feedback, which gathered insights from students, faculty, and administrators regarding usability and effectiveness. The findings confirm that the system improves project tracking, streamlines task management, and facilitates real-time communication, all within an intuitive and structured user interface.

4.1 Functional Evaluation

Each module of the system was tested for usability, performance, and effectiveness:

- Student Module: Students were able to submit project details, including the title, description, and deadlines. They could track their progress through milestone-based monitoring, manage tasks by setting priorities, and submit work for faculty review. Real-time feedback from faculty helped students stay on track.
- Faculty Module: Faculty members could assign tasks, set deadlines, and monitor student progress through real-time dashboards. They provided structured feedback, approved or rejected submissions, and used automated report generation tools for performance assessment.
- Admin Module: Administrators managed users, assigned roles, and ensured secure access to the system. They monitored overall system performance and maintained data integrity through robust management tools.

These features contributed to increased efficiency, reducing the manual workload for faculty while improving student engagement and accountability in project management.

4.2 Performance Evaluation

To validate the system's efficiency, extensive performance testing was conducted, including page load time analysis, API response time testing, and scalability assessments.

Feature	Average Load Time	API Response Time
Student Dashboard	1.2s	150ms
Faculty Dashboard	1.5s	180ms
Task Assignment	1.0s	140ms
Report Generation	1.8s	200ms

Table -2: Page Load Time and API Response Time

The system consistently maintained low response times, ensuring a fast and smooth user experience. The feedback confirms that users found the system intuitive and efficient, with high satisfaction rates for its functionality and ease of use. However, some users suggested improvements in visual analytics for report generation.

4.3 Addressing Key Challenges

Problem	Solution Provided by the System
Manual tracking led to inefficiencies	Automated milestone tracking provides real-time updates.
Communication gaps between students and faculty	Instant messaging and notifications improve collaboration.
Faculty struggled with managing multiple projects	A centralized dashboard simplifies supervision.

Table -3: Challenges faced and its solutions

By automating key processes, the system has significantly reduced faculty workload, improved student engagement, and increased project submission efficiency.

4.4 Limitations and Future Enhancements

Current Limitations

- Lack of a Mobile Application – A mobile version is necessary for improved accessibility.
- Limited Visual Analytics – The report generation feature lacks interactive data visualization tools.
- No AI-Powered Insights – The system does not yet support predictive analytics for project success rates or recommendations.

Future Enhancements

To further optimize usability, accessibility, and decision-making, the following enhancements are proposed:

1. Mobile Application Development – A dedicated Android and iOS app will provide mobile accessibility.
2. AI-Powered Project Recommendations – Machine learning algorithms will suggest project ideas based on student skills and interests.
3. Offline Mode Support – Students will be able to update progress without an internet connection.
4. Advanced Data Visualization – Dashboards will incorporate interactive charts and real-time performance analytics.
5. Integration with External Tools – The system will link with Google Drive, GitHub, and Trello to streamline project workflow management.

These enhancements will further increase system adaptability, improve user experience, and make the platform more intelligent and interactive. This project provides a structured, real-time, and collaborative approach to student project management, revolutionizing how educational institutions track academic progress.

5. CONCLUSIONS

The Online Portal for Tracking and Managing Student Projects serves as a comprehensive solution to streamline project management in academic institutions. With future enhancements such as mobile accessibility, AI-powered insights, offline support, Qt-based applications, and blockchain security, the system can evolve into a fully optimized, intelligent project management platform that meets the evolving needs of students and faculty. These improvements will ensure long-term usability, scalability, and effectiveness in academic settings. By embracing emerging technologies such as AI, blockchain, Qt, and AR/VR, the system can be transformed into a next-generation academic project management solution, setting new standards for efficiency, security, and innovation in student learning and faculty collaboration.

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