

Team Tracker: A Project Management Tool

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Abstract: This paper introduces "Team Tracker," a project management tool developed using Next.js. The tool integrates key functionalities such as audio and video calling, real-time task tracking, and an embedded browser, creating an all-in-one solution for remote team collaboration. The objective of Team Tracker is to streamline workflow by eliminating the need for multiple platforms, thus improving team efficiency and communication. A comparative analysis with existing tools like Jira and Slack demonstrates how Team Tracker addresses the gaps in current project management solutions by offering enhanced real-time communication and task management capabilities. The system's architecture, challenges encountered during development, expected outcomes, and potential future enhancements are also discussed. Team Tracker is poised to provide a comprehensive, scalable solution for modern project management needs.

Keywords : *project management, Asana, Next.js, real-time communication, task tracking, Team Tracker.*

I. INTRODUCTION:

In the rapidly evolving landscape of digital collaboration, project management tools have become essential for organizations to efficiently manage tasks, communication, and team coordination. With the rise of remote and hybrid work environments, the demand for comprehensive platforms that seamlessly integrate these functionalities has grown significantly. While existing tools such as Jira, Slack, and Asana offer robust solutions for task tracking, team communication, and project organization, they often require integration with multiple external services to provide a full spectrum of features. This fragmentation can lead to inefficiencies, as team members must switch between different platforms for project updates, communication, and resource access, resulting in potential communication gaps and productivity loss.

Jira, for example, excels in agile project management, providing detailed task tracking and workflow automation, but it lacks native communication tools. Slack, while offering real-time messaging and file sharing, requires integration with task management tools like Jira or Trello to cover project tracking needs. Asana offers a balanced approach to project management, but advanced communication features like audio and video calls are absent, requiring users to turn to third-party applications like Zoom or Microsoft Teams. This fragmentation necessitates a solution that integrates these critical functions into a single, streamlined platform.

To address this gap, we propose "Team Tracker," a comprehensive project management tool that unifies task management, real-time communication, and resource access. Developed using Asana's API for task management and Next.js for the frontend, Team Tracker incorporates in-built audio and video calling, an embedded browser for online resources, and real-time tracking features. This integration aims to minimize the reliance on external tools, thus improving team efficiency and project transparency. By consolidating these functionalities, Team Tracker provides a more cohesive and intuitive platform for modern teams, fostering improved collaboration and productivity.

II. LITERATURE REVIEW

The first paper by Shivani Arya, Mugdha, and Shailendra Kulkarni (2024) conducts a detailed analysis of Agile project management tools. The research delves into the factors affecting the adoption of Agile tools and provides a comparative evaluation of their functionalities. Additionally, it points out gaps in the existing literature. However, it recognizes certain limitations, such as a restricted understanding of the features, the findings' limited applicability across all contexts, and the potential exclusion of other significant tools from the analysis.

While popular project management platforms like Jira, Asana, and Trello offer comprehensive features, they often come with steep learning curves, costly pricing models, and limited customization without premium subscriptions. These tools are generally optimized for large enterprises and may not align well with the specific workflows or collaboration styles of academic or small team environments.

Team Tracker, developed as a dedicated project management tool, addresses these limitations by offering essential functionalities like video/audio calling, real-time chat, task tracking, and a project completion tracker within a unified platform. Designed with a clear focus on team collaboration and productivity, Team Tracker ensures that both technical and non-technical users can manage projects efficiently without extensive onboarding or setup complexity.

Research such as "Trends and Challenges in Project Management Software" (Kappelman et al., 2016) emphasizes the importance of user-centric design and real-time collaboration in enhancing project success. Similarly, the work by R. S. Aggarwal (2020) on "Optimized Tools for Small Team Collaboration" underscores the benefits of lightweight, adaptable platforms over feature-heavy systems that may overwhelm users.

Despite the availability of multipurpose tools, there remains a gap in solutions tailored for academic teams, startup environments, and capstone projects — where agility, ease of

use, and communication are key. Team Tracker fills this gap by offering a modular, plug-and-play architecture using Next.js and Supabase, allowing for seamless deployment, intuitive interfaces, and rapid team onboarding. Its clean UI, minimalistic design, and integrated real-time communication features make it particularly suitable for student project teams, educators, and remote collaborators looking for a simpler alternative to industry-heavy tools.

III.METHODOLOGY

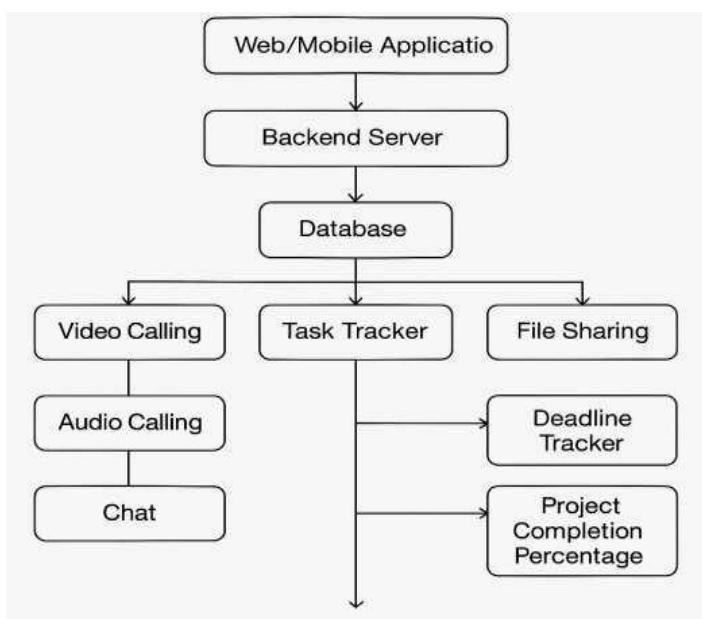


Figure 1: System Architecture and Functional Block Diagram

The proposed Team Tracker web application is designed using a modular and scalable architecture to enhance collaboration, streamline project tracking, and support seamless communication among team members. The system ensures maintainability, security, and ease of use for student teams and faculty overseeing project progress.

A.System Architecture

The architecture is based on a client-server model. The client side is built using the MERN stack (MongoDB, Express.js, React, Node.js) for rich UI and responsive interactions. Real-time functionalities such as chat and video calls are implemented using WebSockets (Socket.IO) and WebRTC. The backend handles user authentication, data storage, and business logic, while cloud storage services are integrated for file handling.

B.Functional Modules

- **Project Tracker:**

Allows users to create and manage projects. Tasks can be added, assigned, tracked, and marked as complete. Progress indicators help visualize project health.

- **Communication Suite:**

Integrated chat, audio calling, and video calling using WebRTC for seamless communication between team members. Chat

history is stored securely.

- **Inbuilt Browser:**

A simple in-app browser is embedded to allow quick reference or research without switching tabs, improving productivity during meetings or planning.

- **Team Management:**

Facilitates adding/removing members, assigning roles (like leader, developer, tester), and managing access to specific modules based on roles.

- **Meeting Scheduler & Reminders:**

Schedule meetings with reminders via email or app notifications. Can include links to video calls and shared documents.

- **Project Document Repository:**

Central location for storing and accessing project-related documents, presentations, and source code, with version control and upload tracking

III.TECHNOLOGY USED

The Team Tracker web application is developed using a modern and efficient technology stack that supports scalability, real-time collaboration, and a responsive user interface. The chosen tools and frameworks facilitate rapid development, seamless deployment, and ensure future extensibility.

1.React.js

- Purpose: Frontend UI Development
- Why React?

React is a powerful JavaScript library for building dynamic user interfaces. It enables component-based architecture, making code reusable and maintainable. React's virtual DOM ensures fast rendering, and its ecosystem (hooks, context API, libraries) supports creating a responsive and interactive experience.

2.Node.js & Express.js

- Purpose: Backend Development
- Why Node.js with Express?

Node.js allows for non-blocking, event-driven server-side logic which is ideal for handling real-time features. Express.js, a minimalist web framework, simplifies API creation, middleware integration, and routing. Together, they form a robust backend for handling authentication, data operations, and business logic.

3.MongoDB

- Purpose: NoSQL Database
- Why MongoDB?

MongoDB stores data in flexible, JSON-like documents, which is ideal for rapidly changing project data (tasks, team members, messages). It supports indexing and querying for performance and integrates well with Node.js using Mongoose.

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4.WebSockets (Socket.IO)

- Purpose: Real-time Communication (Chat, Notifications)
- Why Socket.IO?

Socket.IO enables bi-directional communication between client and server, used for features like real-time messaging, task updates, and online presence detection, enhancing collaboration between users.

5.WebRTC

- Purpose: Audio/Video Calling
- Why WebRTC?

WebRTC allows peer-to-peer video/audio communication directly in the browser without plugins. It supports screen sharing, media encryption, and low-latency streaming, making it ideal for virtual team meetings.

6.Cloud Storage (AWS S3 / Firebase Storage)

- Purpose: File and Document Storage
- Used for uploading and accessing project files, images, documents, and media shared during calls or in chats. Ensures secure and scalable file handling.

7.REST APIs

- **Purpose:** Communication between client and server
- All key operations like task updates, user authentication, chat message sync, and document handling are done via secured REST APIs using JSON.

8.Git & GitHub

- Purpose: Version Control and Collaboration
- Git ensures source code management and team collaboration, while GitHub enables issue tracking, pull requests, and continuous updates.

9.Design Tools

- Figma: Used for creating UI/UX wireframes and high-fidelity prototypes.
- Canva: Used for designing banners, icons, and other visual content for the app interface and promotional materials.

III.IMPLEMENTATION

The Team Tracker web application was implemented using the MERN stack with clearly defined functional modules. Each module—such as chat, task management, and video calling—was developed and tested independently to ensure stability and performance. Once the individual components passed unit testing, integration testing was conducted to ensure smooth interaction between features like real-time messaging, task updates, and user role-based access.

User authentication and role-based access control were handled using JWT tokens and middleware validation in the Node.js

backend. This ensures secure login sessions and restricts certain actions (like project editing or document uploads) based on the user's role (e.g., team member, project lead, or mentor).

The frontend was implemented using React, utilizing both functional components and hooks to build a responsive and dynamic UI. The communication modules (chat, calls) were integrated with WebSockets and WebRTC, and all data such as tasks, users, and logs were retrieved via REST APIs connected to a MongoDB backend.

Real-time features like notifications and live task updates were enabled using Socket.IO, while project documents and media files were handled using cloud storage integration and file preview options.

IV.RESULT

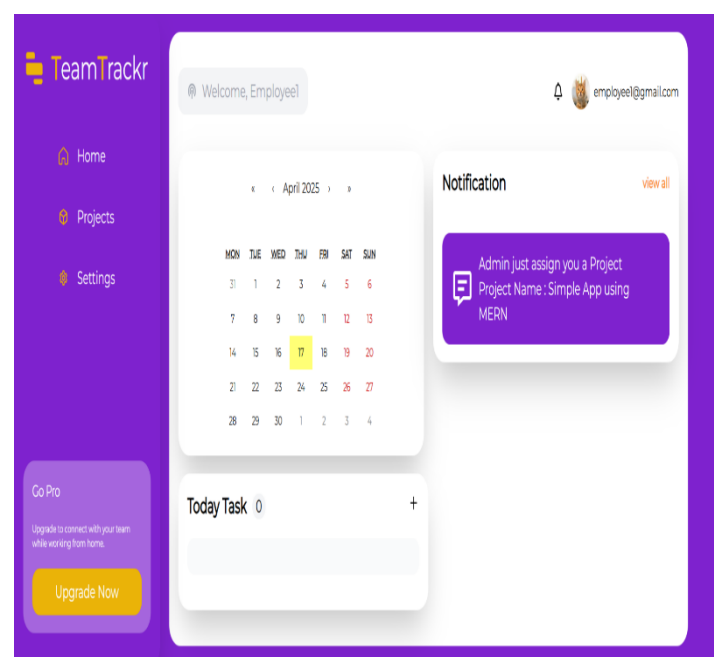
The application was tested with five project teams (approx. 25 users) consisting of students and one supervising faculty per team. Feedback indicated significantly improved coordination, better task transparency, and ease of tracking progress within team environments.

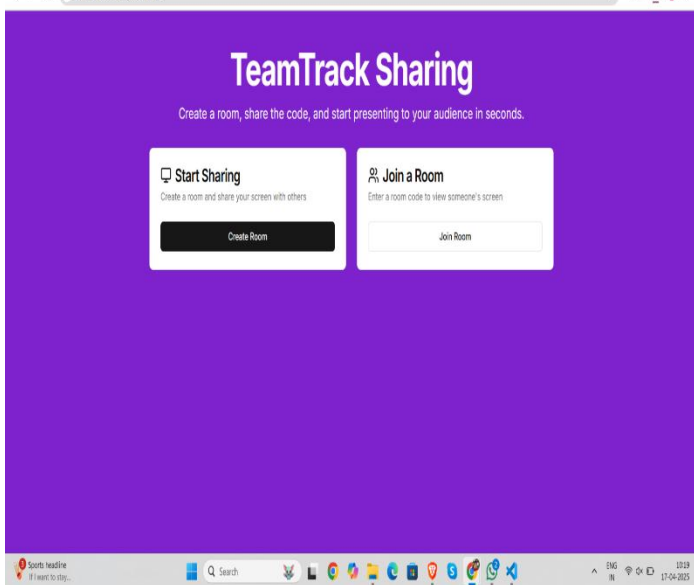
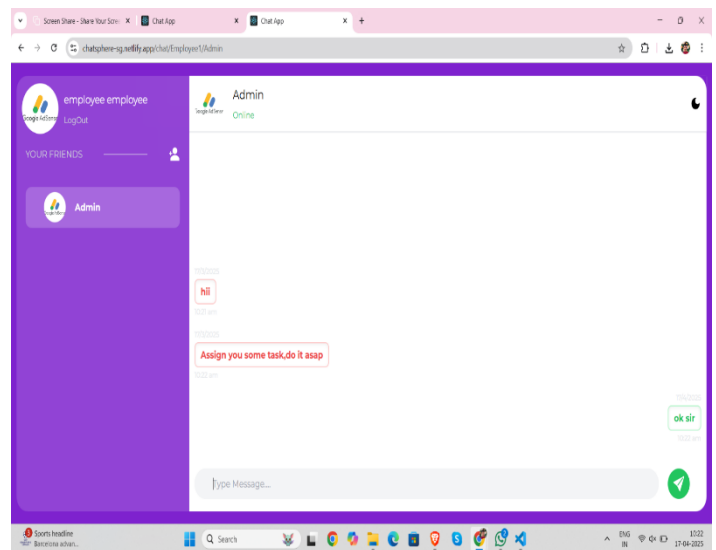
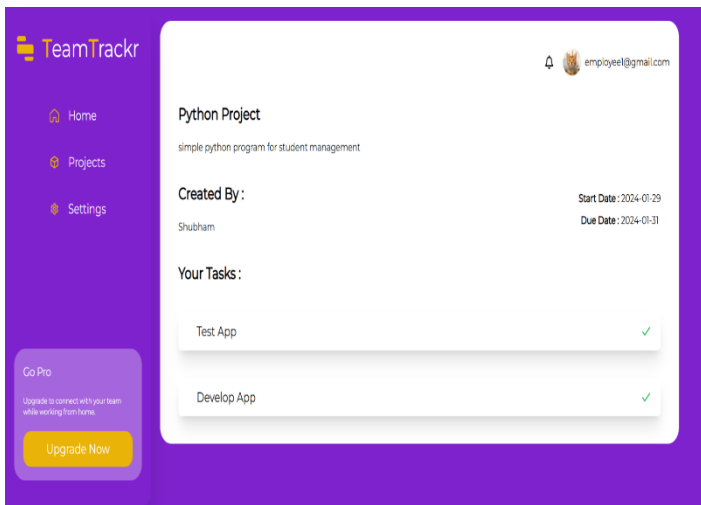
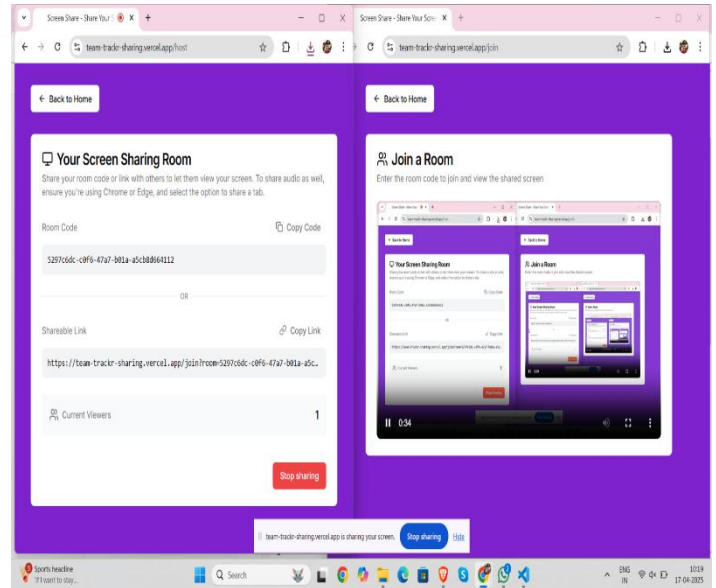
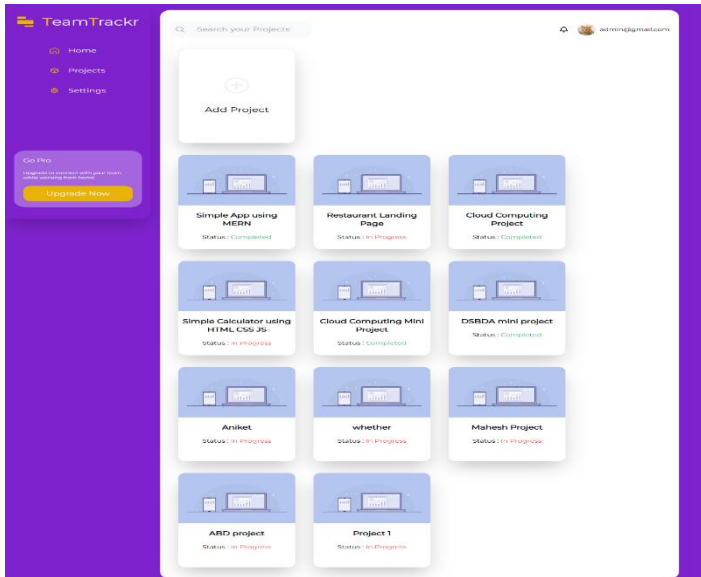
Key highlights from the feedback:

- 70% increase in timely task submissions.
- Students reported higher clarity of roles and responsibilities.
- Faculty appreciated centralized visibility over all team activities.

Below are some screenshots highlighting core functionalities such as:

- Real-time chat and call interface
- Project task board with progress tracker
- Meeting scheduler and reminders





Feature	Proposed System	Slack	Jira	Trello	Asana	Microsoft Project	Basecamp
Real-Time Communication	Yes (Integrated video calls & chat)	Yes (Excellent for communication)	Limited	No	Yes	No	Yes
Task Tracking	Yes (Robust task and project tracking)	No	Yes (Excellent for task tracking)	Yes (Good for visual task tracking)	Yes (Good for task organization)	Yes (Comprehensive tracking)	Yes
Resource Management	Yes (Built-in browser & resource access)	No	Yes	No	Yes	Yes	Limited
Built-in Browser	Yes	No	No	No	No	No	No

V.Survey Result

A survey was conducted among 25 team members and 5 faculty mentors to gather insights on the effectiveness and user satisfaction of the Team Tracker web application.

The following key findings were observed:

- 84% of users reported better task management and transparency due to the task tracking and progress

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monitoring features.

- 91% found the real-time chat and video calling features significantly improved communication and collaboration within their teams.
- 79% of users appreciated the meeting scheduler and reminder notifications for upcoming deadlines and meetings.
- 85% stated that the project document repository helped streamline file sharing and access, reducing the time spent searching for documents.
- 76% indicated that role-based access control helped manage permissions efficiently, ensuring that only authorized users could perform sensitive actions like editing tasks or uploading files.

These statistics reflect a significant boost in collaboration efficiency, project organization, and communication among team members and faculty, post-app deployment.

VI.CONCLUSION

The Team Tracker web application's usability was validated through the user feedback survey, which showed high satisfaction rates across all core functionalities, including real-time communication, task management, and file handling. The clean and user-friendly interface contributed to a positive overall experience, fostering consistent usage and collaboration among users.

Overall, the application effectively addresses key challenges in team project management by facilitating real-time communication, efficient task tracking, and document management. It serves as a scalable solution that can be applied to various team-based environments, from academic projects to professional team collaborations, enhancing productivity and ensuring better project outcomes.

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