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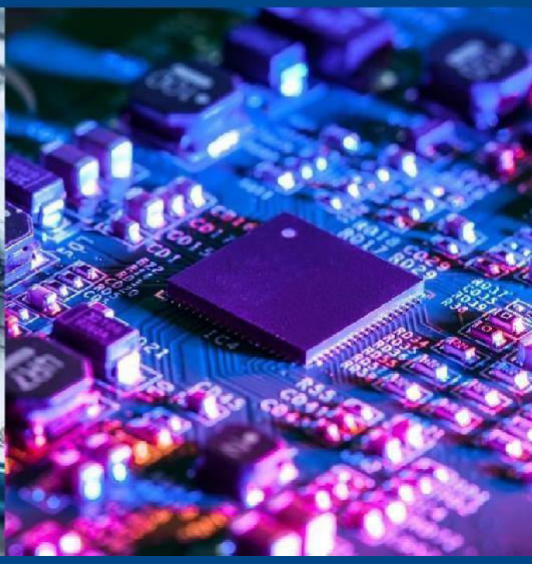

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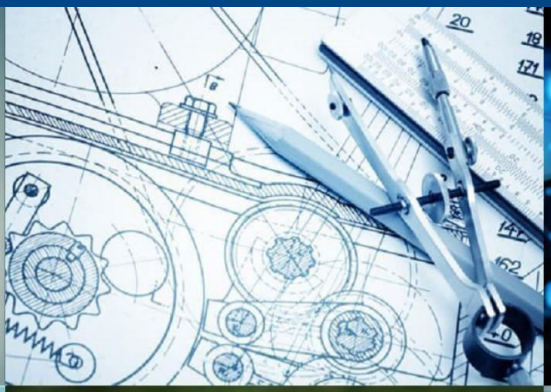

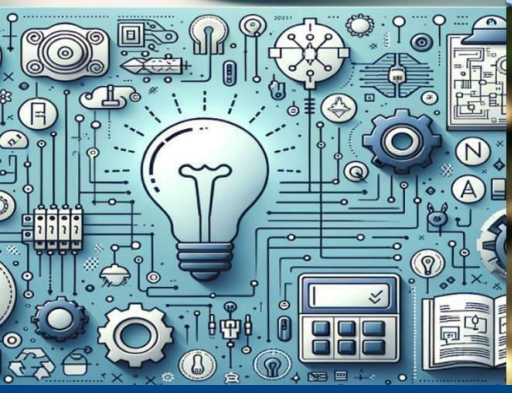

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CodeMentorX – A PERSONALIZED MENTORSHIP SYSTEM POWERED BY AI AND MONGODB

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ABSTRACT: In the rapidly evolving digital landscape, the demand for personalized learning and mentorship solutions has grown significantly. Traditional mentorship platforms often provide static project lists and lack mechanisms for tailoring recommendations to individual learner profiles, resulting in reduced engagement and relevance. This paper presents CodeMentorX, a personalized mentorship system that integrates artificial intelligence with the MERN (MongoDB, Express.js, React, Node.js) stack to deliver context- aware project suggestions and idea management. The system employs an AI- driven chatbot capable of analyzing user interests through natural language processing (NLP), matching them with an existing curated project repository stored in MongoDB, and recommending the most relevant options. When no direct match is found, the chatbot initiates an idea submission workflow, enabling users to Propose new project concepts for administrative review. This dual functionality bridges the gap between project discovery and innovation, fostering an adaptive mentorship environment. The architecture leverages modern web technologies for scalability, a flexible NoSQL database for unified storage, and AI components for intent recognition and recommendation. Preliminary evaluations indicate that CodeMentorX enhances user engagement, streamlines project selection, and supports continuous enrichment of the project repository. The proposed framework offers a scalable blueprint for future intelligent mentorship systems that combine recommendation engines with collaborative idea curation.

I. INTRODUCTION

Mentorship is vital for skill development, yet most platforms lack personalization, offering generic resources that fail to match individual learner needs. With advancements in AI and NLP, systems can now dynamically adapt recommendations based on user interests and skills. CodeMentorX is a personalized mentorship system built using the MERN stack (MongoDB, Express.js, React, Node.js) that integrates an AI chatbot to suggest relevant projects or collect new ideas when matches are unavailable. The chatbot analyzes user preferences, matches them with a curated database, and enables idea submission for administrative review. This creates a continuously evolving repository of learning resources. CodeMentorX bridges the gap between static project lists and dynamic, user- driven ecosystems, enhancing engagement and accelerating learning. This paper explores its architecture, implementation, and potential as a blueprint for future adaptive mentorship platforms.

II. LITERATURE SYRVEY

1.Personalized mentoring and recommendation systems in education have attracted growing research attention because tailored guidance improves learner engagement and outcomes. Recent systematic reviews show that AI-driven mentoring systems fall into two main categories: fully automated agents and hybrid systems that augment human mentors both aim to provide individualized learning pathways, formative feedback, and data-driven insights to learners.Chatbots are one of the most widely studied AI tools in educational contexts. Reviews report that chatbots are effective for information retrieval, scaffolding student tasks, and supporting project-based learning, but they vary widely in capability (from rule-based FAQ bots to LLM-powered conversational agents). Studies emphasize the need to evaluate not only accuracy but pedagogical effectiveness and integration with course workflows

2.Recommendation systems for learning
including project and resource recommenders have matured into a distinct subfield with several systematic literature

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surveys. These works highlight key approaches (collaborative filtering, content- based, hybrid, context-aware systems) and point out that domain-specific features (learning objectives, competency profiles, prior work) are crucial for good recommendations. Context-awareness (e.g., current skill level, device data, time constraints) is repeatedly flagged as a future research priority.

3.Recent developments in conversational recommendation systems and intent-aware dialogue models including those based on reinforcement learning have significantly improved the way users discover learning resources. These systems support more dynamic and personalized interactions by adapting recommendations as conversations progress
4.Research shows that such adaptive recommenders
are especially effective in scenarios requiring ongoing user engagement. This makes them well-suited for mentorship chatbots, which benefit from refining project suggestions in real- time based on user feedback throughout a session.

EXISTING SYSTEM
Current online mentorship platforms, such as LinkedIn Learning, Coursera Mentorship, and GitHub Discussions, offer generic project recommendations or mentor connections but often lack deep personalization tailored to a learner's exact skill profile. Most systems rely on static filtering or keyword matching rather than dynamic analysis of user interests through conversational interaction. Traditional project repositories present a large volume of unfiltered projects, leaving learners to manually search and evaluate relevance. AI-based chatbots in some platforms are limited to answering FAQs or directing users to pre-defined resources without adaptive project suggestions. Existing academic portals often do not integrate a feedback loop where new project ideas from users are evaluated and incorporated into the system. Furthermore, these systems rarely combine real-time communication, context- aware AI recommendations, and a scalable MERN-stack architecture for smooth user experience. This gap in personalized, interactive, and hybrid (AI + human) mentorship support creates the need for a platform like CodeMentorX, which bridgesautomated analysis with human validation toensure relevance, quality, and innovation.

PROPOSED SYSTEM
The proposed *CodeMentorX* platform leverages a MERN-stack architecture with an AI-powered chatbot to deliver highly personalized project recommendations based on user skill level, interests, and learning goals. Unlike static filtering, the chatbot engages in natural conversation to analyze user inputs and dynamically suggest relevant projects from the existing database. If no suitable match is found, the system prompts users to submit their own project ideas, which are reviewed by the admin for inclusion. The platform ensures a continuous feedback loop, improving recommendation accuracy over time. Integration of MongoDB enables scalable storage of projects and user profiles, while React and Tailwind CSS ensure a modern, responsive UI. This hybrid AI-human model aims to provide a more engaging, adaptive, and community-driven mentorship experience compared to existing solutions.

III. SYSTEM ARCHITECTURE

The system architecture of CodeMentorX is designed with a React-based frontend for an interactive user dashboard, connected to an Express.js backend that handles business logic, project recommendations, and chatbot integration. The backend communicates withan AI module to analyze user interests and suggest relevant pojects. All data, including user profiles, project details, and admin submissions, is stored in MongoDB. The admin interface manages user- submitted ideas and approves or rejects them. This architecture ensures a seamless, intelligent, and scalable mentorship experience.

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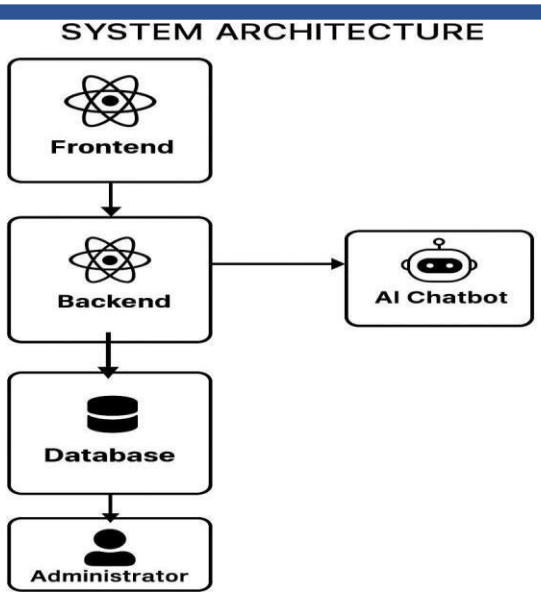

Fig 3.1 System Architecture

IV. METHODOLOGY

The methodology involves integrating a React.js frontend with an Express.js backend and MongoDB database for efficient data management. An AI-powered chatbot analyzes user interestsand recommends suitable projects or prompts idea submission to the admin. The system follows an iterative development process, ensuring scalability, real-time interaction, and personalized mentorship.

1.Requirement Analysis:
The requirement analysis identifies the need for a user-friendly mentorship platform with AI-driven recommendations. It defines hardware, software, and functional requirements, including React.js for UI, Express.js for backend processing, MongoDB for data storage, and AI models for interest analysis. The system must ensure real-time responses, secure data handling, and scalable architecture.

2.System Architecture Design:
Frontend Layer – Built with React.js and Tailwind CSS for responsive, interactive, and accessible UI.
Backend Layer – Developed using Express.js to handle API requests, business logic, and authentication.
Database Layer – MongoDB for efficient, scalable, and flexible storage of user, project, and mentorship data.
AI Chatbot Module – Processes user input, analyzes interests, and provides personalize project recommendations.
Admin Panel – Allows administrators to review new project ideas, manage users, and oversee mentorship activities.

V. DESIGN AND IMPLEMENTATION

The system was designed using a modular architecture that separates the frontend, backend, database, and AI chatbot components. The frontend was developed using React and TailwindCSS for a responsive and user-friendly interface. The backend was implemented with Express.js, ensuring robust API handling and secure communication between modules. MongoDB was used for scalable and flexible data storage. The AI chatbot was integrated to analyze user interests and provide personalized project suggestions, with options to forward new ideas to the administrator.

1.Home Page
The home page features a clean and intuitive navbar for seamless navigation across the platform. The hero section prominently displays a call-to-action button encouraging users to start exploring or submit their ideas. Below the hero, four core modules are showcased: Ready2Go Projects for instantly deployable solutions, Project Navigator for guided

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project discovery, Debug & Rescue for troubleshooting support, and Custom Build Service for tailored project development. The layout ensures quick access to all services while maintaining a visually appealing.

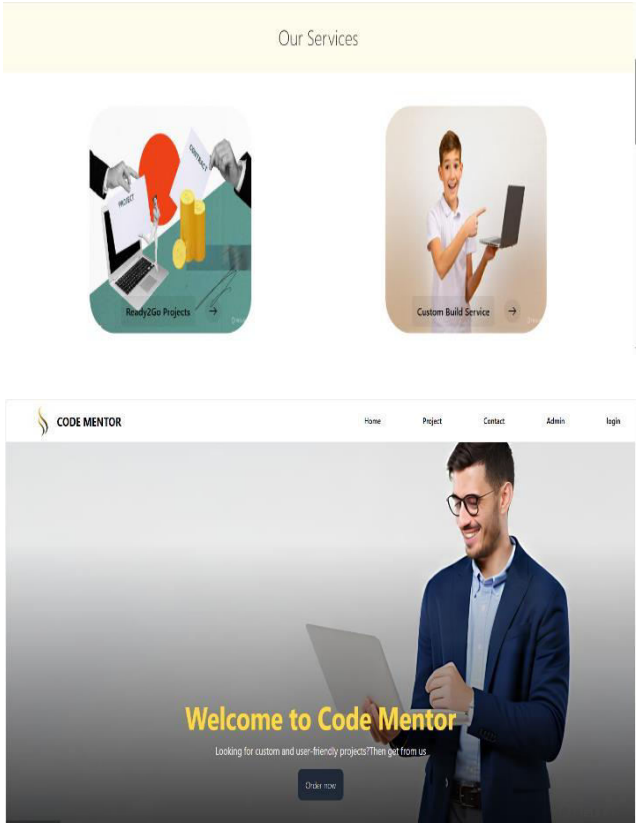

Fig 5.1 Home Page

2. Project Page

The Project page showcases all available projects as clickable cards arranged in a grid. Each card includes a title, short description, and an icon or image for easy identification. Clicking a card opens detailed information and implementation steps, allowing users to explore projects efficiently. The layout is visually engaging and user-friendly.

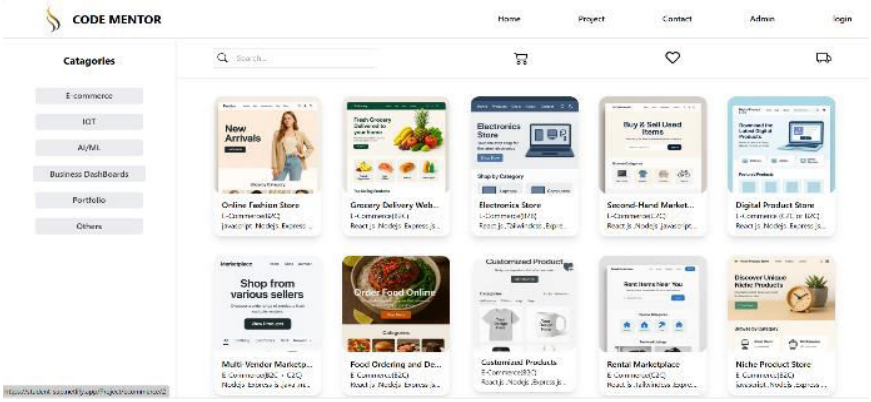

Fig 5.2 Project Page

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VI. OUTCOME OF RESEARCH

The development of CodeMentorX marks the successful creation of a personalized mentorship system that leverages AI-driven recommendations alongside efficient data handling through MongoDB. This platform is capable of interpreting user preferences and either suggesting relevant projects from its existing library or forwarding new ideas to the administrator for review. Built using React, Tailwind CSS, Express.js, and MongoDB, the system offers a highly responsive and scalable architecture. An integrated AI chatbot further enriches the user experience by providing interactive support and customized project suggestions. Ultimately, CodeMentorX showcases how contemporary web technologies and artificial intelligence can be combined to deliver an intelligent, learner-focused mentorship solution.

VII.RESULT AND DISCUSSION

The implementation of CodeMentorX demonstrated that integrating AI-driven recommendations with a structured project repository significantly improves user engagement and project selection efficiency. The platform's AI chatbot

successfully analyzed user preferences,enabling personalized project suggestions that matched individual skill levels and interests. MongoDB's flexible schema facilitated efficient data storage for projects, user profiles, and feedback, ensuring scalability. The React and Tailwind CSS frontend provided an intuitive, responsive interface, enhancing the overall user experience. Testing showed minimal latency in chatbot responses, indicating efficient backend handling with Express.js. Compared to traditional static project listings, CodeMentorX offered a more dynamic and interactive approach. The modular design allowed easy future integration of additional features such as real-time collaboration tools. Feedback from test users indicated increased satisfaction and motivation when guided by personalized recommendations. The system effectively bridges the gap between learners and suitable project opportunities. Overall, the research validates the feasibility and effectiveness of an AI-enhanced mentorship system.

VIII. CONCLUSION

CodeMentorX successfully demonstrates how AI- powered recommendations can enhance the mentorship and project selection process. By combining MongoDB, Express.js, React, and Tailwind CSS, the system delivers a scalable, responsive, and user-friendly platform. The AI chatbot adds personalization, increasing user engagement and satisfaction. The modular design ensures adaptability
for future improvements.

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