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LiveCollab: A Real-Time Collaborator

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Abstract: *In recent years, the demand for real-time collaborative tools has increased significantly due to the rise of remote work, online education, and distributed software development teams. Traditional collaboration platforms often require users to switch between multiple applications for brainstorming, coding, and communication, leading to inefficiency and reduced productivity. This paper presents the design and implementation of a Real-Time Collaborative Whiteboard and Code Editor, a web-based platform that integrates visual brainstorming, live code editing, and audio-video communication within a single environment.*

The proposed system allows multiple users to join a shared virtual room where they can simultaneously draw diagrams on a digital whiteboard, write and edit source code in real time, and communicate using video and audio chat. The application is developed using the MERN stack, with Socket.IO enabling real-time synchronization of whiteboard actions and code changes, and WebRTC facilitating low-latency peer-to-peer video communication. The system ensures instant propagation of user actions such as drawing, typing, cursor movement, and text insertion across all connected clients.

This integrated collaborative approach enhances teamwork, reduces context switching, and improves overall efficiency. The project demonstrates the practical application of real-time communication protocols and modern web technologies, making it suitable for software development teams, educators, and students engaging in collaborative learning and problem-solving..

Keywords: Real-Time Collaboration, Whiteboard Application, Code Editor, WebSockets, Socket.IO, WebRTC, MERN Stack, Collaborative Learning

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