**1. Title & Team Info**

**Project Title:** **Collaborative Drawing Board**  
**Subtitle:** A Real-Time Canvas for Remote Collaboration

**Team Members:**

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**2. Problem Statement**

In today’s connected world, working and learning remotely has become the new normal. Whether it’s teams brainstorming ideas, teachers explaining concepts, or students collaborating on projects — real-time interaction is essential. However, most available tools make this difficult. They often:

* Separate communication from collaboration,
* Are too complex for casual users, or
* Hide essential features like shared drawing and messaging behind paid subscriptions.

**Our Solution:** The **Collaborative Drawing Board** was created to solve these challenges. It brings everything together in one simple, easy-to-use platform where users can **draw, chat, and work together on a shared canvas** — all in **real time**.  
Unlike many other tools, it focuses on **speed, smooth user experience, and cross-platform accessibility** (Web + Mobile).  
By combining real-time drawing and communication into one lightweight solution, this project helps users stay connected, creative, and productive — no matter where they are.

**3. App Description**

* **Platform:** Web (Next.js) + Mobile App (React Native via Expo)
* **Purpose:** Facilitate real-time drawing, chatting, and community collaboration
* **Use Case:** Educators, students, creative teams, remote professionals

**4. UI/UX Design**

* **Tools Used:** Figma, Tailwind CSS, Material Icons
* **Key Screens:** (I have send you the pictures in a zip file, please add it here)
* **User Journey:**
  1. Register/Login
  2. Create/Join Board
  3. Draw & Chat in Real Time
  4. Create & Join Communities
  5. Save or Export Canvas

**5. Architecture**

#### Frontend (Client Side):

* **Web Application:** Built using **Next.js** and styled with **Tailwind CSS**
* **Mobile Application:** Developed using **React Native (Expo)**
* **User Interface (UI):** Designed with **HCI principles** for ease of use and responsiveness
* **State Management:** Handled using **Redux** for consistent user experience across components

#### Backend (Server Side):

* **Real-Time Server:** Built with **Node.js** to manage client communication and data flow
* **WebSockets (Socket.IO):** Enables real-time, bi-directional communication between client and server
* **Database & Authentication:** Managed using **Firebase** (Realtime Database and Firebase Auth)
* **Concurrency Control:** Region- and zone-based locking algorithms prevent drawing conflicts

**6. Key Features**

* Firebase Authentication
* Real-Time Drawing via WebSockets
* Region & Zone Locking to prevent overlap
* Text Chat in Boards & Communities
* Save/Export Canvas (JPG, SVG)
* Join/Invite via ID or Link
* Offline detection with alerts

**7. Testing**

* **Functional Testing:** Auth, Drawing, Canvas saving, Board creation, community creation, joining board, joining community, chatting in canvas, chatting on communities, add/remove to favorite,
* **Usability Testing:** Multiple device testing.
* **Performance Testing:** Tested real-time drawing with up to 5 users simultaneously

**8. Future Scope**

Planned Additions:

* Offline Drawing Mode & Sync drawing after reconnect
* Drawing History Playback
* Voice/Video Chat Integration
* Full iOS Optimization