Final Project of the Mobile Computing course 2024/2025

Secure Encrypted Messaging App

TEAM MEMBERS:

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1. Team Members

Role	Responsibilities
Project Manager	Oversaw development lifecycle & coordination
Frontend Dev	Implemented UI/UX & screen navigation
Backend Dev	Managed Firebase integration & encryption
UI/UX Designer	Designed app flow & visual assets
QA Engineer	Tested security & cross-device compatibility

2. Idea Description

A **secure end-to-end encrypted messaging app** focused on privacy, featuring:

- 🔒 **Military-grade encryption** for messages/media
- 📞 **Secure voice/video calls** with blurred backgrounds
- 🔥 **Firebase Realtime Database** for synced conversations
- 🔲 **Cross-platform compatibility** (iOS/Android)
- 🔔 **Push notifications** for calls/messages
- ♡ **Anonymous authentication** (email/username hybrid)

Built with **Expo + React Native** for performance and **React Native Gesture Handler** for intuitive interactions.

3. Key Features

Authentication Flow
- Biometric login with email/username fallback
- "Remember me" session persistence
- Firebase Auth integration
- Password recovery system

Messaging
- End-to-end encrypted text/image/location sharing
- Swipe-to-delete conversations
- Searchable chat history
- Online status indicators

- Message timestamps & read receipts

Calls

- Background blur during calls
- Camera toggle (front/back)
- Speakerphone control
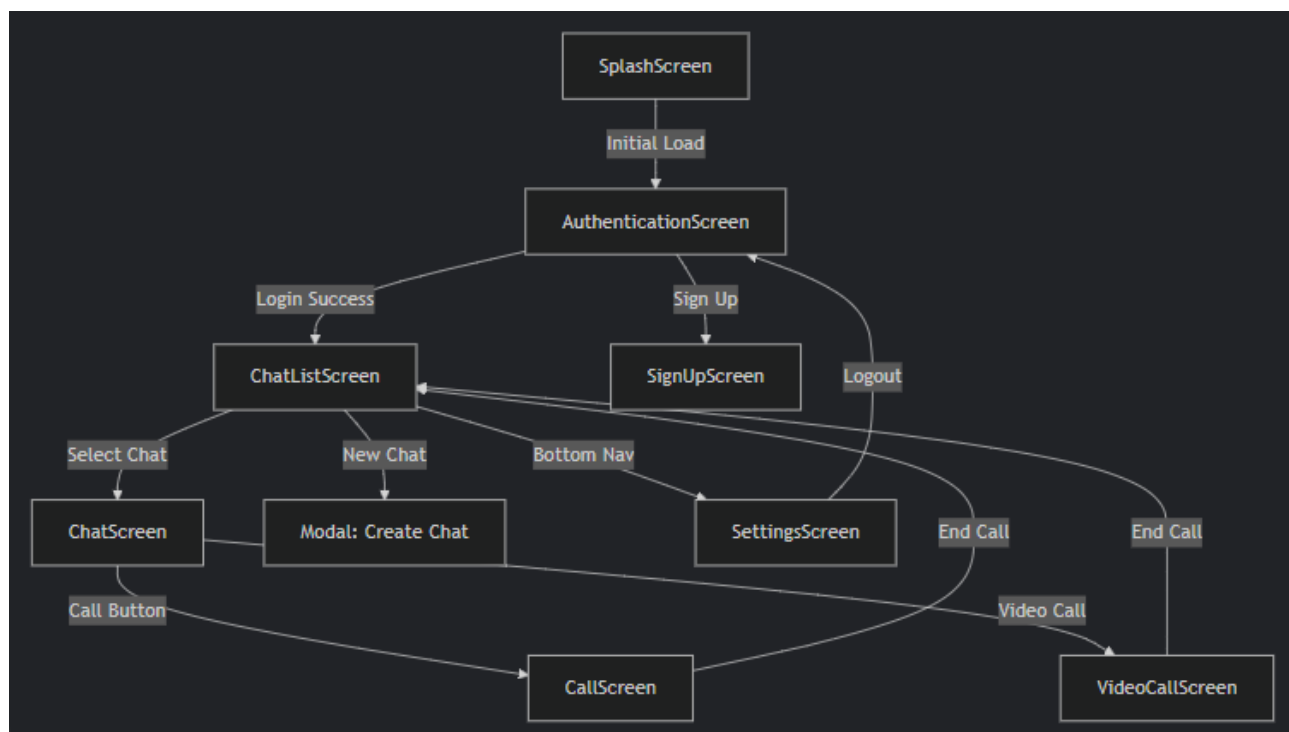- Call notifications with permission flow

Security

- AES-256 message encryption
- Firebase security rules
- Permission-gated features (camera/location)
- Auto-logout after inactivity

Additional Features

- Customizable notification preferences
- Age/gender filters for matchmaking
- Privacy policy integration
- Responsive design for all screen sizes

4. Screen Pipeline & Interactions

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Key Interactions

1. **Authentication Flow**
   - SplashScreen → AuthenticationScreen (3s delay)
   - Firebase username/email validation
   - Notification permission request on first login

2. **Chat Management**
   - ChatListScreen ↔ ChatScreen (real-time updates via Firebase)
   - Swipe-right to delete chats
   - FAB (+) opens modal for new chat creation

3. **Call System**
   - ChatScreen → CallScreen/VideoCallScreen with contact propagation
   - Background blur via @react-native-community/blur
   - Camera permissions handled through Expo

4. **Navigation**
   - Bottom tab bar: Chats ↔ Calls ↔ Settings
   - Header back buttons with unified styling
   - Animated transitions between screens

5. **Data Flow**

   User Input → Firebase Auth → Realtime DB → State Update → UI Render
   Media → Expo ImagePicker → Firebase Storage → Encrypted Delivery

5. Technical Highlights

Encryption Pipeline

1. **Key Generation**: RSA-2048 on user registration
2. **Message Encryption**: AES-256-CBC per message
3. **Key Exchange**: Diffie-Hellman during first contact

Performance Optimizations

- **Memoization**: React.memo for chat list items
- **FlatList Virtualization**: For large message histories
- **BlurView Optimization**: Platform-specific implementations

Security Measures

- JWT token refresh cycle

- Firebase security rules validation

- Input sanitization for all text fields

DevOps

- Expo EAS for CI/CD

- Firebase emulator suite for local testing

- Error tracking via Sentry

6. Future Roadmap

1. **Group Chats**

2. **Message Expiration**

3. **Screen Security** (anti-screenshot)

4. **Web Extension**

5. **Blockchain-based Identity Verification**