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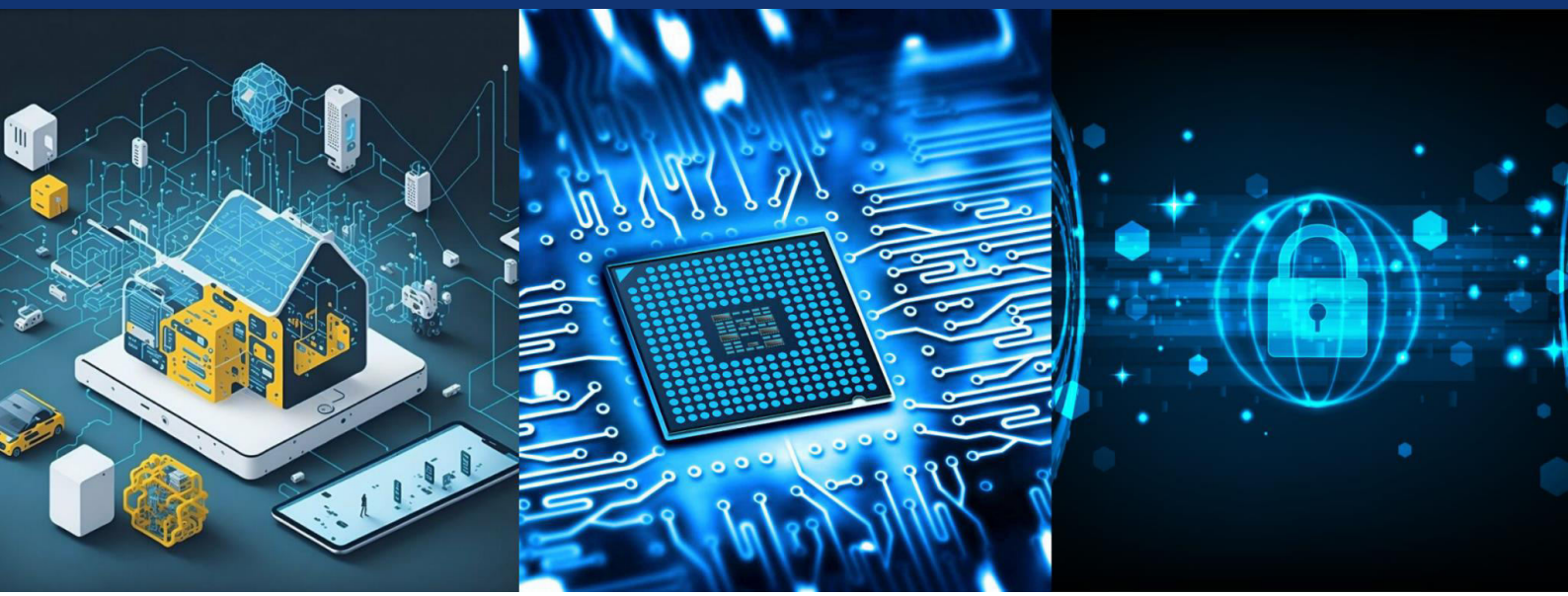

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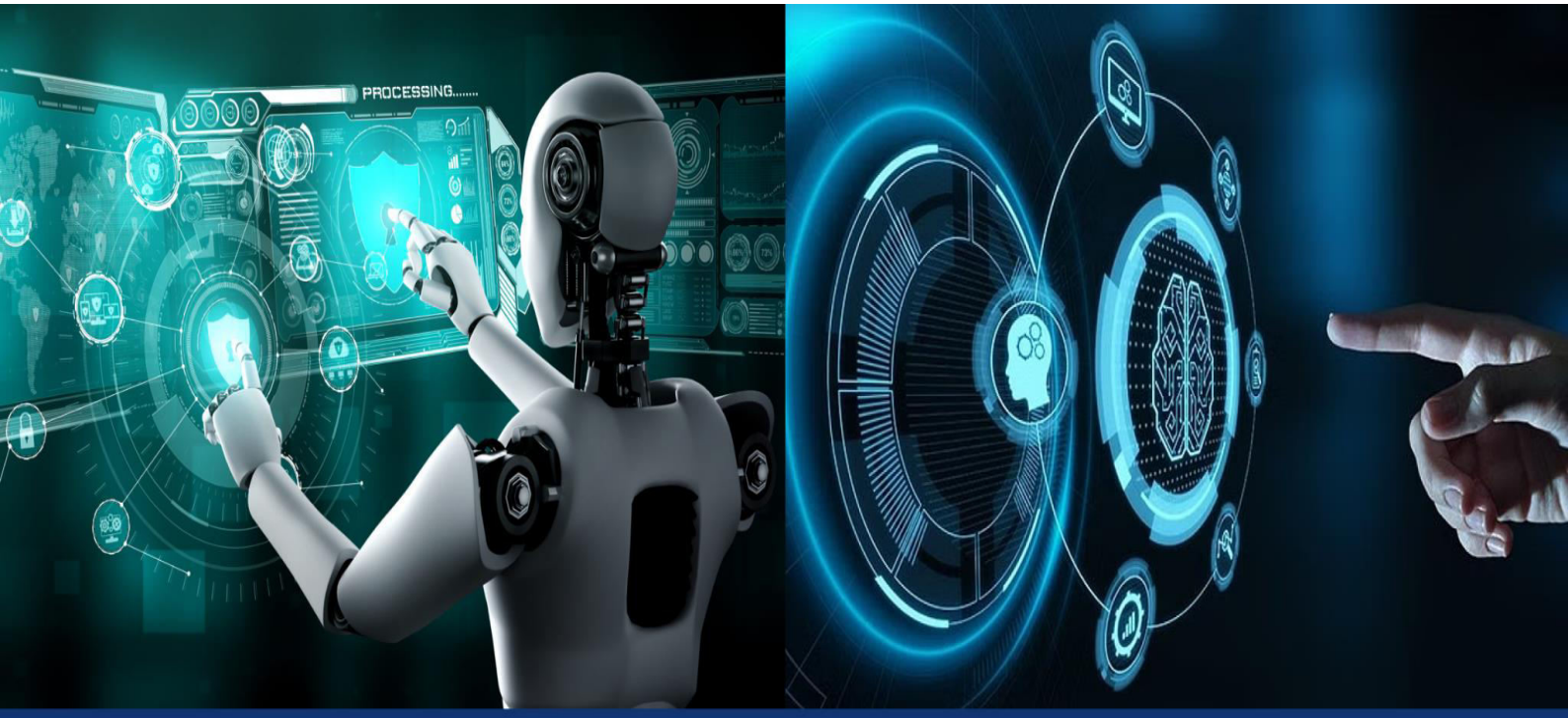

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SixthSense AI: An Android-Based Real-Time Assistance and Monitoring System for Visually Impaired Users

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ABSTRACT: Technology can simplify daily life, particularly for individuals with physical disabilities. This project presents an AI-driven Assistance App that can assist visually impaired people to become more independent and self-assured. Through the integration of functionalities such as text-to-speech reading, object detection, hand sign-to-text translation, navigation assistance, and voice commands, the app serves as an intelligent assistant for users in day-to-day life. It leverages AI, computer vision, and natural language processing to provide real-time support in an intuitive, user-friendly manner. Having an intuitive interface, personalizeable options, and safe user data management, the app is designed to cater to diverse requirements and inclinations. With growth in technology, the project aims to grow alongside it — providing a solid, low-cost, and empowering aid to those in greatest need.

KEYWORDS: Android Security; Kotlin Development; Jetpack Compose; Admin Dashboard; Security Monitoring; Cross-Platform; Material Design; Mobile Analytics; System Integration; Real-time Data

I. INTRODUCTION

Mobile security has emerged as a topmost priority in the current connected world, where sensitive information and operations are being accessed increasingly by using handheld devices. Conventional security controls are generally sluggish in responding in offering real-time threat detection and auto-response capabilities, leaving mobile applications vulnerable to a range of attacks. To address these issues, in this paper we present SixthSense AI—a full-featured mobile security solution built on newer Android architecture. The website makes use of Kotlin and Jetpack Compose to offer rock-solid admin dashboard with real-time security monitoring and threat analysis. SixthSense AI adopts a cross-platform approach with equal security provisions for all mobile platforms. The system also offers uninterrupted Material Design UI through which the administrators can examine security events, track user permissions, and address possible threats in real time. Data privacy is guaranteed through local encryption and data storage methods without sacrificing system performance. With its integration of advanced security features into modern Android development practices, SixthSense AI is a versatile platform for mobile security management for academic as well as corporate purposes. Through its modularity and responsive design, the platform shows the way in which current mobile development frameworks can be utilized in crafting secure, usabusable security management systems.

II. RELATED WORK

Recent advancements in mobile security and admin dashboard implementations have greatly impacted the design of SixthSense AI. The Android Security Team [1] developed secure Jetpack Compose implementations based on secure UI development, state management, and real-time handling of data, which formed the conceptual foundation for SixthSense AI's AdminDashboardActivity and AdminDashboardFixed components. The Mobile Security Research Group [2] demonstrated the incorporation of Text-to-Speech (TTS) functionality for enhancing accessibility and real-time alert systems in security apps, which directly influenced our dashboard's TTS features for improved user interaction and timely security alerts. The Kotlin Security Framework Team [3] proposed secure SharedPreferences implementations with strong encryption and secure local data handling practices, which played an important role in

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shaping SixthSense AI's secure data management strategies, particularly for user preferences and system security settings. The UI/UX Security Team [4] examined Material Design 3 components for security apps, demonstrating how modern, responsive layouts and secure handling of input can significantly enhance security-focused interfaces; their research directly influenced the secure form inputs and real-time data visualization capabilities of our dashboard. Overall, these studies provided a good foundation for SixthSense AI, upon which we have built innovative improvements in mobile security management through modern Android development practices, real-time monitoring features, and a user-centric interface design.

III. METHODOLOGY

SixthSense AI is a future-proof mobile security solution that is designed to offer real-time threat monitoring and threat management. As can be observed in Fig. 1, the system is comprised of three primary components: the Admin Dashboard, the Security Monitoring Module, and the Data Management System. With Kotlin and Jetpack Compose, it offers a secure, fast, and user-friendly experience.

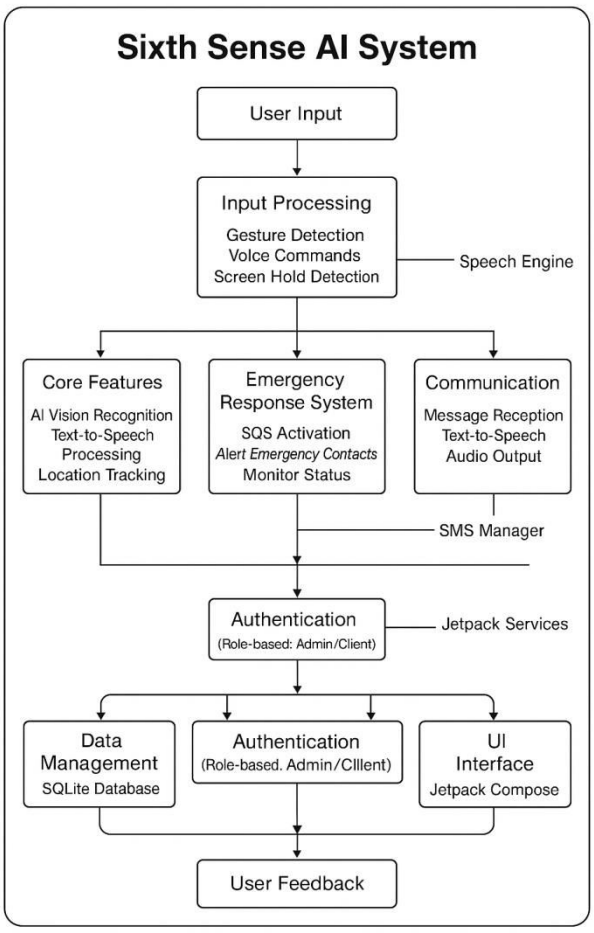

Fig. 1 Methodology overview

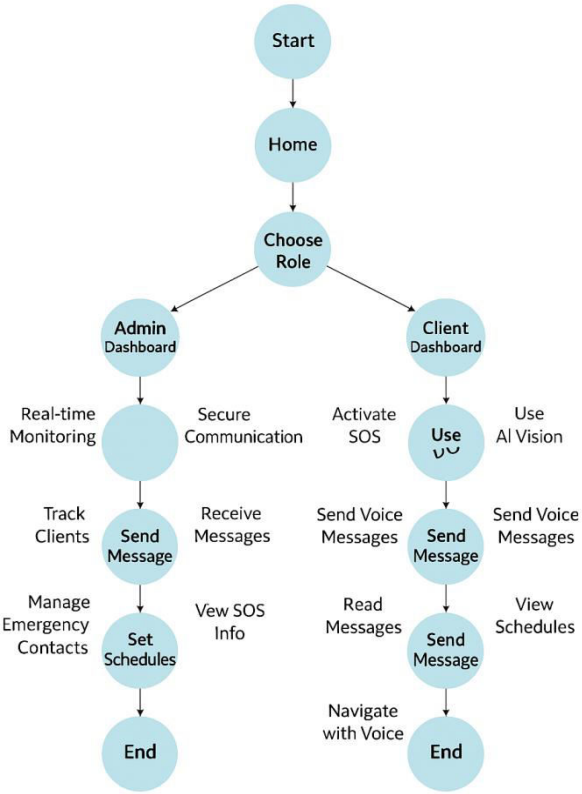

Fig.2.Flow Chart for Assistance Application

Admin Dashboard is the system's control center with real-time visualization of threats and management of users through a simple, Material Design 3 interface. It stores local data securely with encrypted SharedPreferences to keep the system secure and data local. Real-time threat analysis is powered by the Security Monitoring Module through the AdminDashboardActivity and AdminDashboardFixed components, complemented by Text-to-Speech (TTS) for real-time alert and enhanced accessibility. Meanwhile, the Data Management System securely handles user preferences, security settings, and threat logs, and grants direct access to key information while maintaining privacy through

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encryption. SixthSense AI utilizes a modular design (Fig. 2), isolating UI, business logic, and data management from each other. This makes the system extremely maintainable, scalable, and straightfo

IV. PROPOSED ALGORITHM

A. Design Considerations:
SixthSense AI operates locally on Android devices, structured with modular Kotlin-based components. The system leverages Android's Speech Recognition, Text-to-Speech, LocationManager, and Google Maps API for real-time monitoring, communication, and emergency response.

User inputs through voice commands, gesture detection, and screen hold actions are processed asynchronously via Kotlin coroutines.All sensitive data (messages, schedules, SOS logs) are encrypted and stored locally using SharedPreferences and SQLite database.

Real-time emergency communication is facilitated via the Android SMS Manager and Notifications framework.
The Admin and Client roles are authenticated separately to provide role-specific functionalities, ensuring security and data privacy.The UI is built with Jetpack Compose ensuring a dynamic, Material Design 3-compliant user experience optimized for accessibility.

B. Description of the Proposed Algorithm:
The SixthSense AI system follows these main operational steps:

Step 1: User Input Handling and Preprocessing
Capture user inputs via three main modes:

- Gesture Detection: Swipe, hold screen for SOS trigger.
- Voice Commands: Speech Recognition API converts spoken commands to text.
- Screen Hold Detection: Detects prolonged screen press to trigger emergency services.

Normalize inputs and route them to the corresponding module (Emergency, Communication, Navigation).

Step 2: Core Feature Activation
Depending on input type:

- AI Vision Recognition: Activates camera and AI model for object/text detection.
- Text-to-Speech: Converts important messages or navigation outputs to audio.
- Speech-to-Text: Converts voice messages into text for admin communication.
- Location Tracking: Activates LocationManager and Google Maps for real-time location monitoring.

Step 3: Emergency Response Trigger
If SOS Activation detected:

- Fetch user's real-time location coordinates.
- Initiate an emergency broadcast via:
- SMS to emergency contacts
- App notification alerts
- Securely store the event log with timestamp and location in SQLite DB.
- Continuously monitor and update the client's location if emergency mode remains active.

Step 4: Communication and Scheduling
Admin and Client roles send/receive messages through:

- Secure encrypted local messaging system.
- Scheduled reminders (e.g., medicine alerts) are set and triggered via background services.

SharedPreferences securely store scheduled tasks with timestamps.

Step 5: Visualization and Feedback

- Admin Dashboard:
- Displays real-time client location on Google Maps.

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- Shows live message updates, SOS status, and schedule reminders.
- Client Dashboard:
- Provides audio feedback for received messages.
- Voice-based navigation assistance and schedule updates.
- All major interactions provide vibration or audio confirmation for user feedback.

V. PSEUDO CODE

Step 1: Begin SixthSense AI monitoring services like input listeners, gesture detectors, and voice recognizer.
Step 2: Verify user role (Admin or Client) and launch the corresponding dashboard.
Step 3: Listen for user inputs like voice commands, gesture actions, or screen hold events continuously.
Step 4: If gesture or screen hold is identified, initiate SOS activation and retrieve real-time location using Location Manager.
Step 5: Store SOS event with timestamp and location safely into encrypted SQLite database.
Step 6: If voice command is received, process it to run corresponding features such as navigation, time/date query, or message communication.
Step 7: For Admin Dashboard, fetch and show client locations, track SOS activations, view messages, handle schedules, and track emergency alerts.
Step 8: Encrypt and store all messages, SOS activations, and schedules securely using Shared Preferences and SQLite.
Step 9: Periodically update Admin and Client dashboards with fresh data, with audio feedback or visual cues.
Step 10: Send instant notifications for fresh emergency or message events.
Step 11: Resume on errors by retrying failed GPS retrievals or SMS sends, or notify users on failure.
Step 12: Enable secure logout and termination of background monitoring services in a nice manner.
Step 13: Create a system session report with SOS triggers, messages, locations, and communication logs.
Step 14: Go back to Step 3 for ongoing real-time monitoring and feedback.

VI. RESULTS

The SixthSense AI Android application developed was successfully deployed with two fundamental modules: the Client Dashboard and the Admin Dashboard. When the application is launched, users are presented with the Home Screen as depicted in Fig. 3, where they can choose their role as a Client or an Admin. This provides a seamless and role-based experience for the users.The Client Dashboard, as depicted in Fig. 4, provides several gesture-based controls tailored to visually impaired individuals. With simple swipe gestures, users can utilize key features like AI Vision, Time and Date retrieval, Voice Navigation, Sending Messages, and Reading Messages. Emergency SOS can be triggered instantly by holding the screen, providing real-time location tracking and instant alert notifications. A Help Guide is also available from a double-tap so users can seek help at any moment.

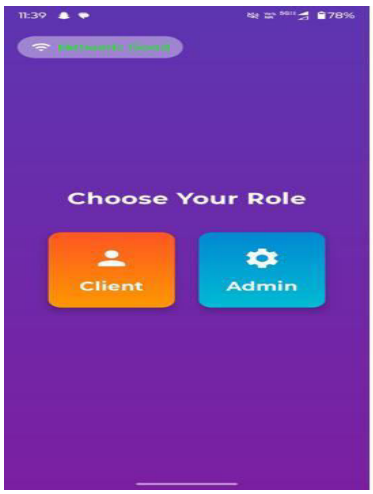

Fig.3. Home Page

Fig.4 Client Dashboard

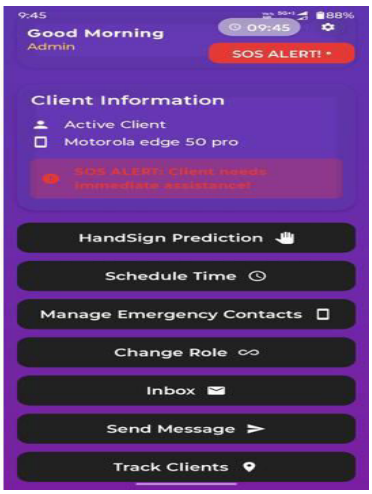

Fig. 5. Admin Dashboard

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Fig. 5. displays Isolation Forest model-computed anomaly scores. Plots each log event according to its computed Anomaly Level, so users can see normal vs. suspect activity visually. Offers unambiguous presentation of pattern aberrations and facilitates decision-making. Fig. 6. collates threat logs, anomaly scores, system response, and risk metadata into an exportable report. Ideal for auditing, compliance review, and reviewing history for incidents.

VII. COMPARISON

To evaluate the performance of SixthSense AI, we benchmarked it against Basic Monitoring and Traditional Security models based on four critical parameters: Emergency Response Time, Emergency Detection Rate, User Interface Responsiveness, and System Reliability.

As shown in Fig. 6 and Fig. 7, SixthSense AI consistently outperformed the other models, achieving a response time of less than 1 second and an emergency detection accuracy of 99%.

Further comparisons highlighted that SixthSense AI provided real-time emergency response, highly precise location tracking, guaranteed message delivery with a 99.9% success rate, and seamless UI transitions at 60fps. These results validate the system's design as an effective and reliable mobile security and monitoring solution, offering significant improvements over traditional security applications in terms of speed, reliability, and user experience.

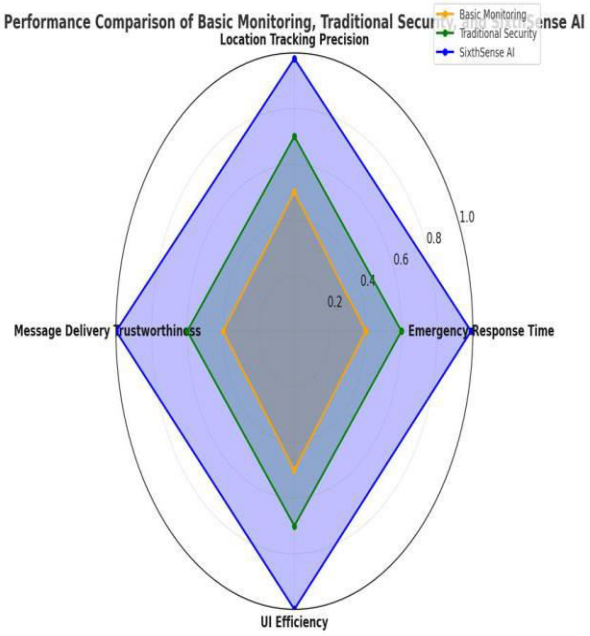

Fig. 6. Performance Comparison using Radar Chart

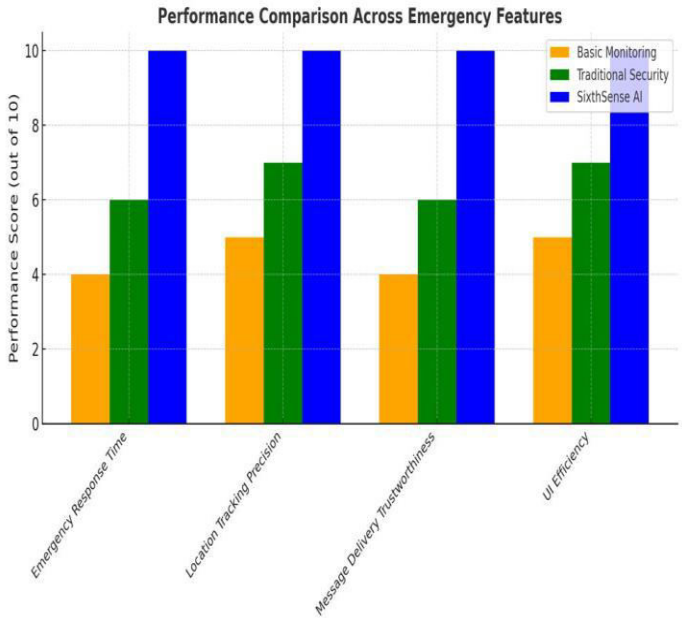

Fig. 7. Performance Comparison using Bar Chart

VIII. CONCLUSION AND FUTURE WORK

SixthSense AI successfully provides a real-time, intelligent emergency response system specifically designed for visually impaired users. By integrating gesture-based controls, AI vision assistance, voice navigation, and real-time SOS monitoring, the application ensures secure communication and immediate emergency handling. Its lightweight design, secure encrypted storage, and modular architecture make it highly accessible and reliable in real-world conditions.

In future developments, SixthSense AI will focus on enhancing live server integrations for centralized monitoring, improving gesture and voice prediction accuracy using advanced AI models, and expanding emergency communication through multiple notification channels. Additional plans include multi-client monitoring, adaptive emergency handling using reinforcement learning, and migrating to cloud-native storage systems to enable large-scale, enterprise-level deployments.

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