

GPS TRACKING

CASE STUDY



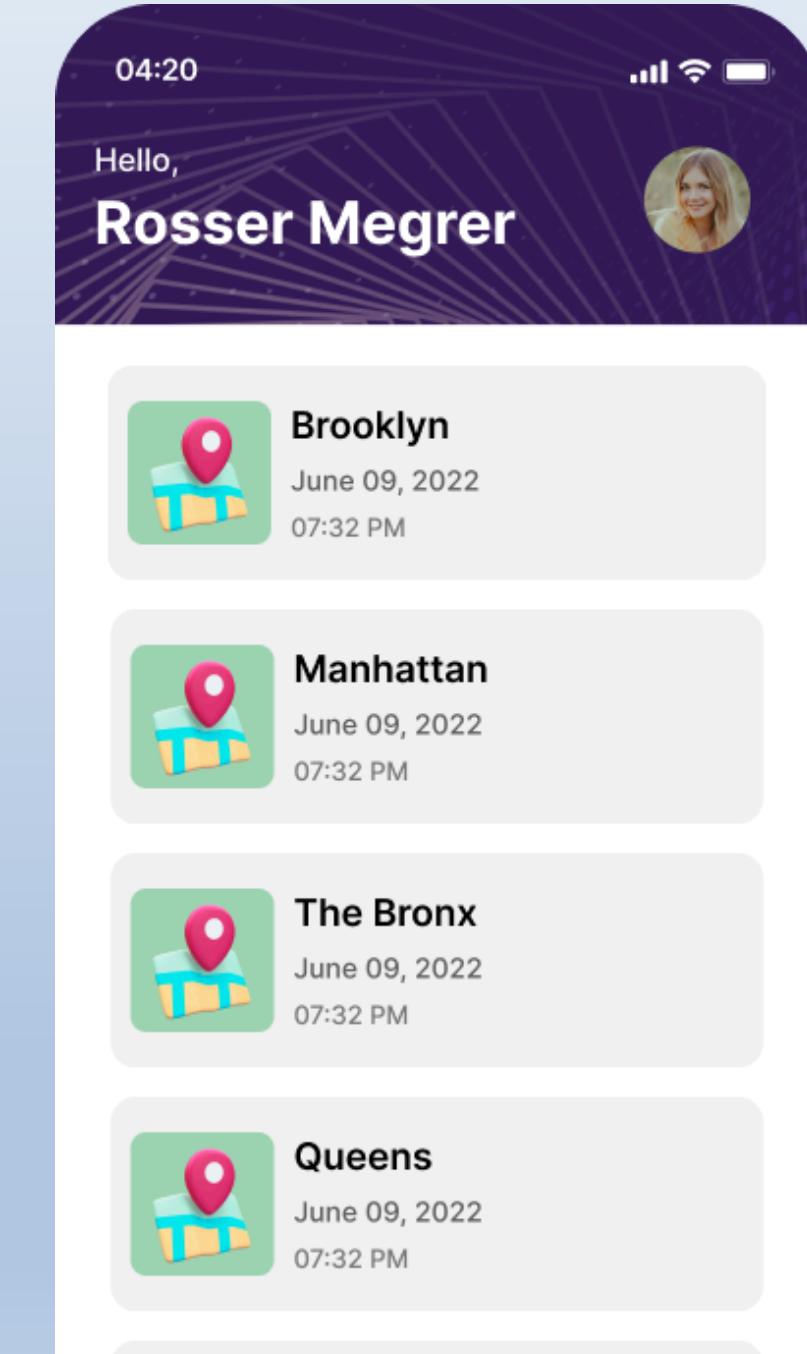
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GPS-Tracking App

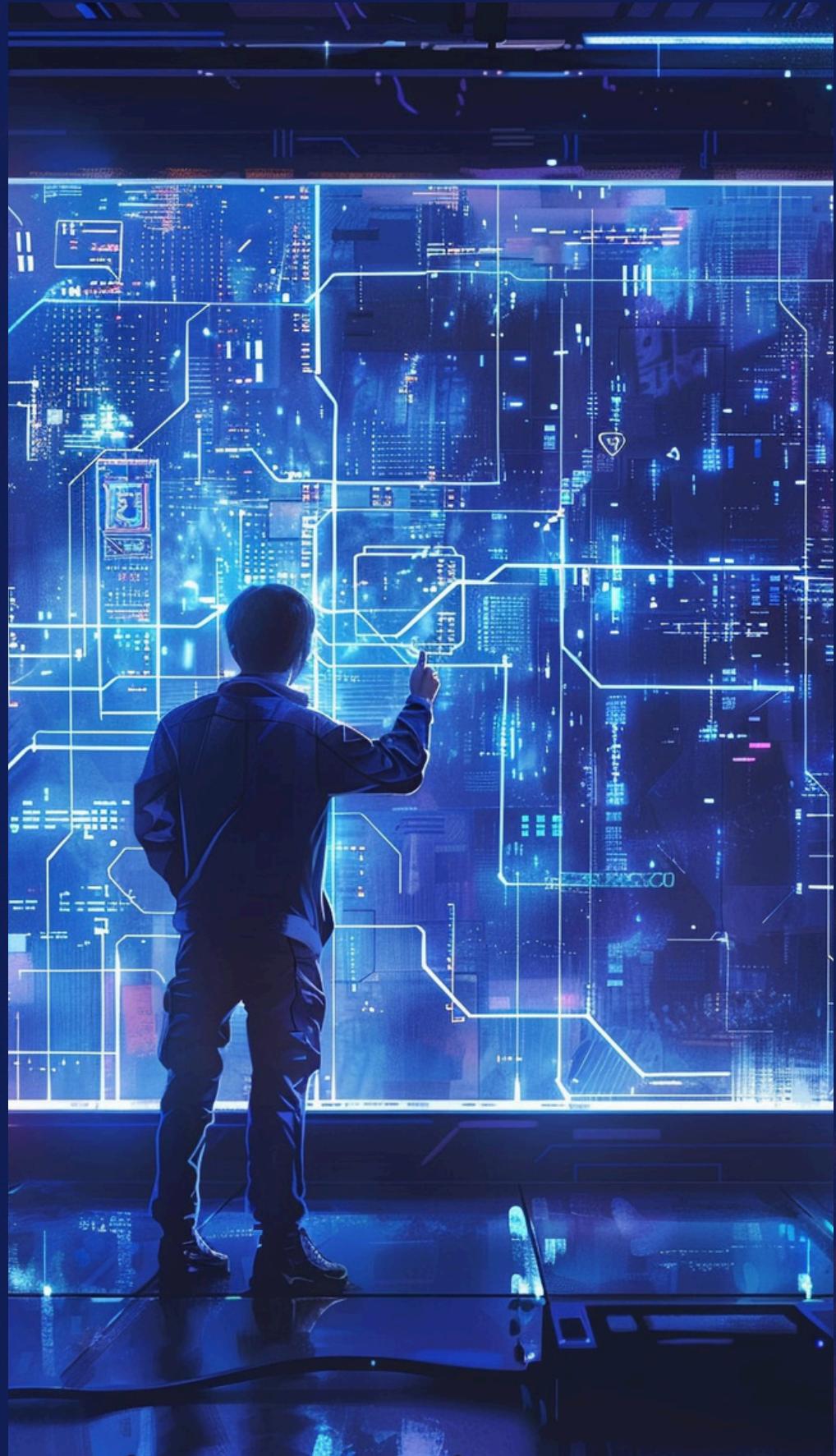
It is a research project aimed at tracking the daily locations of study participants, we developed a mobile application specifically for Android devices. The primary objective was to collect location data while ensuring privacy and data security. This case study outlines the project requirements, key features of the application, and the strategies implemented to encourage participant engagement.

Core Features:

- **Secure Location Tracking**— The app collects and transmits location data securely to a designated database.
- **User Data Management:** Participants entered their unique identifiers (PID) during the initial setup, ensuring that data could be tracked back to the individual.
- **Secure Database Setup:** A secure and user-friendly database was established, allowing researchers to access location data without technical expertise. Key specifications included:
 - A **password-protected admin panel** for database access.
 - **Data Encryption:** All data was encrypted both in transit and at rest to protect participant privacy.
 - **Multi-user Functionality:** The admin could manage multiple users, each with individual access rights.



Challenges and Solution



- **Ensuring User Privacy and Safety**

The app needed to maintain strict privacy protocols due to its focus on personal values and goals. We implemented AES-256 encryption for data protection, secure OAuth 2.0 authentication, and rigorous identity verification to ensure a safe and trusted environment.

- **Building a Reliable Matchmaking Algorithm**

Integrating Creating an algorithm that matches users based on shared values and life goals was complex. We worked on refining the algorithm through user feedback and data analysis, ensuring accurate, meaningful matches.

- **Cross-Platform Compatibility**

Developing the app for both iOS and Android with a unified user experience was essential. Utilizing React Native allowed us to efficiently develop for both platforms while ensuring high performance and smooth functionality.

- **End to End Security**

JSON Web Tokens (JWT) are a compact, URL-safe means of representing claims to be transferred between two parties. JWT provides a powerful method for securing authentication in Node.js applications. Its stateless nature, combined with signature verification and customizable claims, makes it an excellent choice for modern web applications. By implementing JWT correctly, developers can enhance the security of their applications while providing a seamless user experience. We always follow best practices, such as using strong secret keys, implementing token expiration, and securing storage mechanisms.

Technologies Used



- **Cloud Hosting** – AWS (Amazon Web Services) for reliable and scalable cloud infrastructure.
- **Backend Development:** Node.js and MySQL for scalability and real-time interactions.
- **Frontend Development:** Flutter for cross-platform development on iOS and Android.
- **Payment Integration:** Stripe for secure transactions and tipping.
- **Geo-Location Services:** Google Maps API for accurate and real-time location tracking
- **SSL Certification** – For secure data transmission and encryption of user information.
- **Push Notifications** – Firebase Cloud Messaging for real-time notifications.
- **User Data Encryption** – AES-256 encryption for protecting user data at rest and in transit.
- **Real-Time Messaging** – WebSocket protocol for instant communication between users.

Technologies Used



Cloud hosting
AWS (Amazon Web Services) for reliable and scalable cloud infrastructure.



User Data Encryption
AES-256 encryption for protecting user data at rest and in transit.



Node JS
Single Thread Back-End able to withstand thousand request per second.



MySQL
Seamless Relational Database with Atomicity, Concurrency, Integrity and Durability.



Google Maps

Google Maps
Navigate your world with Google Maps—where every journey starts with a tap!



Firebase
Build fast, scale effortlessly, and connect with confidence!



Stripe
Stripe: Where Payments Flow Seamlessly!



Flutter
Beautiful native apps in record time.

Commercial Benefits



- This mobile application not only facilitated the efficient collection of location data for research purposes but also demonstrated a successful engagement model for study participants
- By implementing a combination of incentives and robust security measures, the project ensured high compliance rates among participants while safeguarding their privacy.
- GPS-Tracking App is now positioned as a standout product in the GIS market, offering a refreshing take on global positioning systems by emphasizing accuracy based on directions and coordinates.

Figma: <https://www.figma.com/design/oz5oj61Fxwb5eliRRYS1K5/GPS-Tracking-App-file-1?node-id=0-1&t=aQPNhvVo9V3jYbWa-1>



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