Technical Project Report - Android Module

UniEvents

Subject:	Introdução à Computação Móvel
Date:	Aveiro, 19/06/2024
Students:	108317: Miguel Aido Miragaia 108536: Cristiano Antunes Nicolau
Project abstract:	UniEvents is a mobile application designed to streamline the event attendance experience for university students and event coordinators. Users can browse a comprehensive database of upcoming lectures and seminars, access detailed event information, and register for those. The app features integrated mapping for easy navigation to the event location and digital ticketing for efficient check-ins. UniEvents aims to revolutionize event participation by providing a user-friendly platform that centralizes event management and attendance.

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1 Application concept

UniEvents is an application designed to enhance the event attendance experience for university students and event coordinators. The app provides a centralized platform for discovering, registering, and navigating to academic events such as lectures, seminars, and workshops. By offering detailed event information, seamless registration, and integrated navigation, UniEvents aims to streamline the entire event participation process, making it easier and more efficient for users.

Target Users

1. **University Students**:
    - Sarah Thop, a 25-year-old graduate student pursuing a master's degree in environmental science. Tech interested and proactive, Sarah uses UniEvents to stay informed about relevant academic events, and ensure she attends events punctually.

2. **Event Coordinators**:
    - Matilde Fonseca, a 32-year-old events coordinator at a university. With a focus on organizing and executing successful events, Matilde uses UniEvents to create an event, manage the event logistics, monitor registrations, and facilitate smooth check-ins.

User Benefits

- **Centralized Event Management**: Users can access a comprehensive list of upcoming academic events in one place.
- **Detailed Event Information**: Users can view essential details about each event, including the number of registered attendees, maximum capacity, and venue location.
- **Seamless Registration**: Users can register for events with just a few clicks, ensuring a hassle-free booking process.
- **Integrated Navigation**: Users receive the exact location of the event, and the directions to event venues from their exact position, ensuring they arrive on time and without stress.
- **Digital Ticketing**: Users can access and present digital tickets with QR codes for quick and efficient event check-ins.

Event Coordinators Benefits

- **Efficient Event Organization**: Simplified event details input and management.
- **Real-Time Registration Monitoring**: Capacity and participant insights.
- **Streamlined Check-In Process**: Fast digital ticket verification.
- **Post-Event Analytics and Feedback**: Attendance review and feedback collection.
- **Enhanced Collaboration**: Better team and speaker coordination.

Personas/Actors and Their Main Actions

1. **Sarah Thop (Graduate Student)**

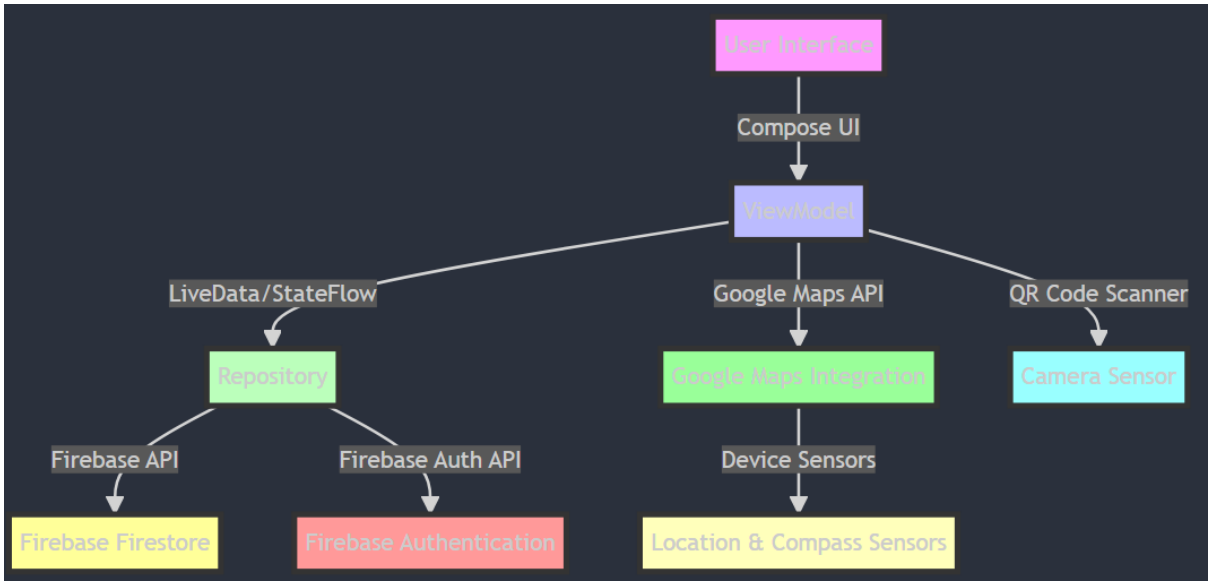
   - **Discover Events**: Sarah logs into UniEvents to browse upcoming lectures and seminars related to her field of study.
   - **Register for Events**: Upon finding an interesting seminar on regenerative farming techniques, Sarah navigates to the event page, reads the detailed description, and registers with a few clicks.
   - **Manage Registrations**: Sarah uses the “My Tickets” section to review her registered events and adjust if necessary (remove a registration...).
   - **Navigate to Events**: On the day of the seminar, Sarah uses the integrated mapping feature to get directions to the venue, ensuring she arrives on time.
   - **Check-In**: At the venue, Sarah presents the QR code from the UniEvents app for a quick and hassle-free check-in.

2. **Matilde Fonseca (Event Coordinator)**

   - **Organize Events**: Matilde uses UniEvents to create and manage event listings. She inputs all relevant details such as event title, date, time, location, and a comprehensive description.
   - **Monitor Registrations**: Throughout the registration period, Matilde monitors participant numbers and manages the event capacity to ensure there is enough space for all attendees.
   - **Facilitate Check-Ins**: On the day of the event, Matilde oversees the check-in process. She and her team use the app to scan QR codes from attendees' digital tickets, ensuring a smooth and efficient entry process.

2 Implemented solution

Architecture overview (technical design)



Layers and Components:

1. **User Interface (UI):**
   - **Jetpack Compose:** Used for building responsive and modern UI components.
   - **Screens:** Each feature (e.g., Login, Event Details) is represented as a Composable function.
2. **ViewModel:**
   - Manages UI-related data and handles communication between the UI and the repository layer.
   - Utilizes LiveData or StateFlow for observing data changes.
3. **Repository:**
   - Acts as a single source of truth for data. It abstracts the data sources (Firebase Firestore, Firebase Auth).
   - Handles data operations and provides a clean API for the ViewModel.
4. **Firebase Integration:**
   - **Firebase Firestore:** Used for storing event details, user data, and tickets.
   - **Firebase Authentication:** Used for managing user authentication (login and registration).
5. **Google Maps Integration:**
   - Utilized for showing event locations on a map.
   - Integrates with device location and compass sensors for navigation and direction.
6. **QrCode Scanner:**
   - Accesses the device camera to scan QrCodes.
   - BarCode Scanning Library: Uses ZXing for code scanning and processing.

7. **Device Sensors:**
    - Accesses location and compass sensors to provide real-time navigation and distance calculations.
    - Uses camera for the Ticket QrCode validation scanner.

Data Models:

1. User

```
data class User(
    val id: String = "",
    val name: String = "",
    val email: String = "",
    val latitude: Double? = null,
    val longitude: Double? = null
)
```

2. Event

```
data class Event(
    val id: String = "",
    val name: String = "",
    val location: String = "",
    val latitude: Double,
    val longitude: Double,
    val date: String = "",
    val time: String = "",
    val organizer: String = "",
    val attendeesCount: Int = 0,
    val capacity: Int = 0
)
```

3. Ticket

```
data class Ticket(
    val id: String = "",
    val eventId: String = "",
    val userId: String = "",
    val qrCode: String = "",
    val status: String = "unused"
)
```

Data Persistence & Content Update Strategies:

- **Firebase Firestore Synchronization:**
  - Real-time listeners are set up to keep the app data in sync with Firestore changes.

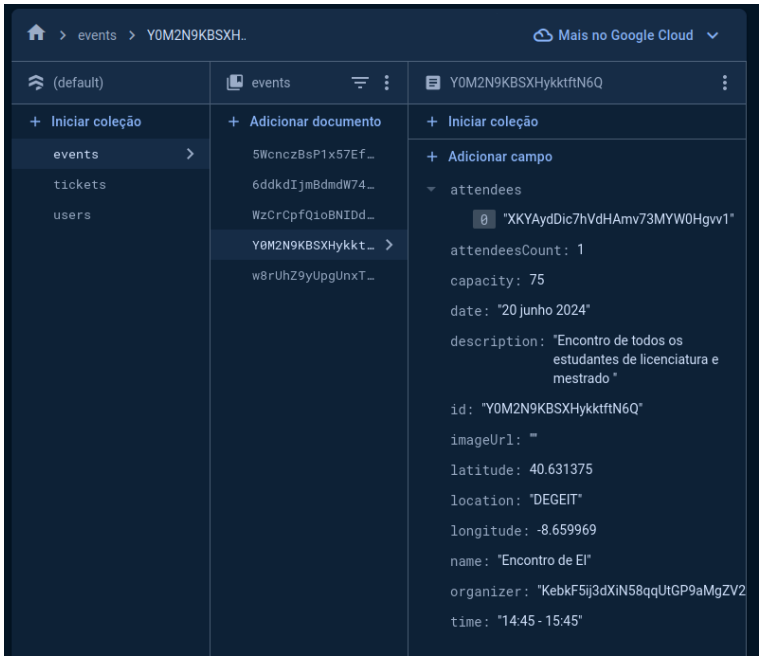
Advanced App Design Strategies:

- **Google Maps and Device Sensors Integration:**
  - **Google Maps API:** Provides event location mapping and navigation.
  - **Location Services:** Continuously updates user location to calculate the distance to the event.
  - **Compass Sensor:** Uses the device's compass to show the direction to the event location.

QR Code Generation and Scanning:

- QR codes are generated for each ticket upon registration.
- **QR Code Scanner:** Uses the camera to scan QR codes for efficient check-ins at events.
- **Libraries:** ZXing for scanning and processing QR codes.

Firestore: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Mais no Google Cloud
(default)
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Iniciar coleção
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events
tickets
users
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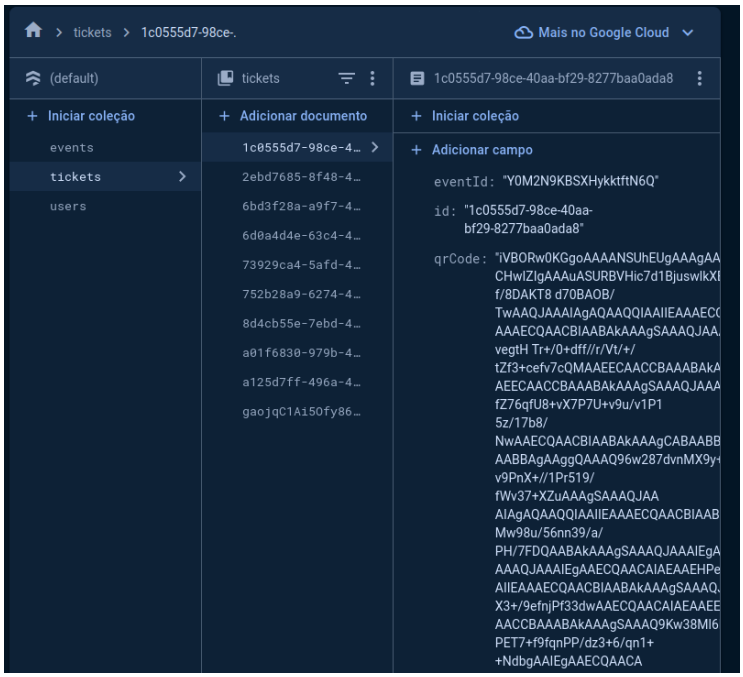
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tickets
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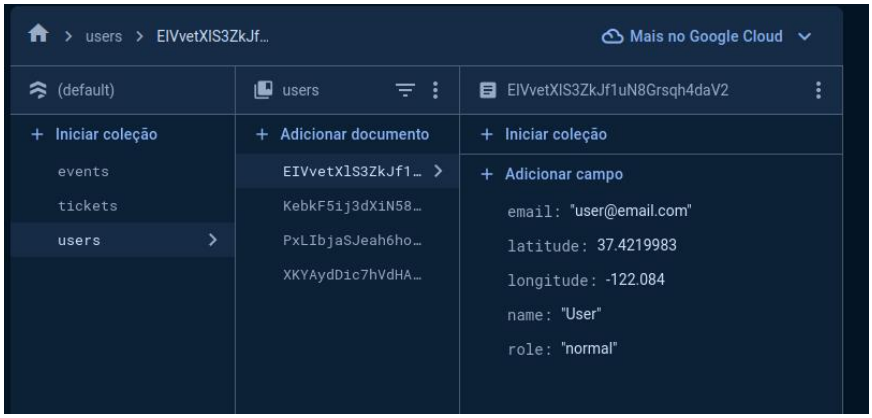
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Mais no Google Cloud
(default)
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Iniciar coleção
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Iniciar coleção
Adicionar campo
events
tickets
users
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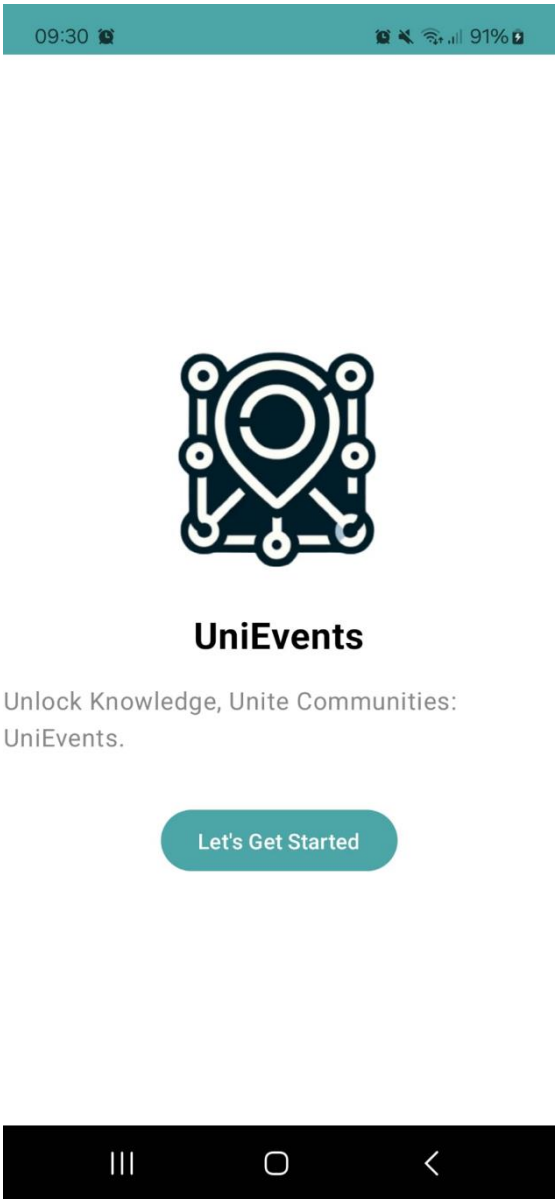
longitude: -122.084
name: "User"
role: "normal"

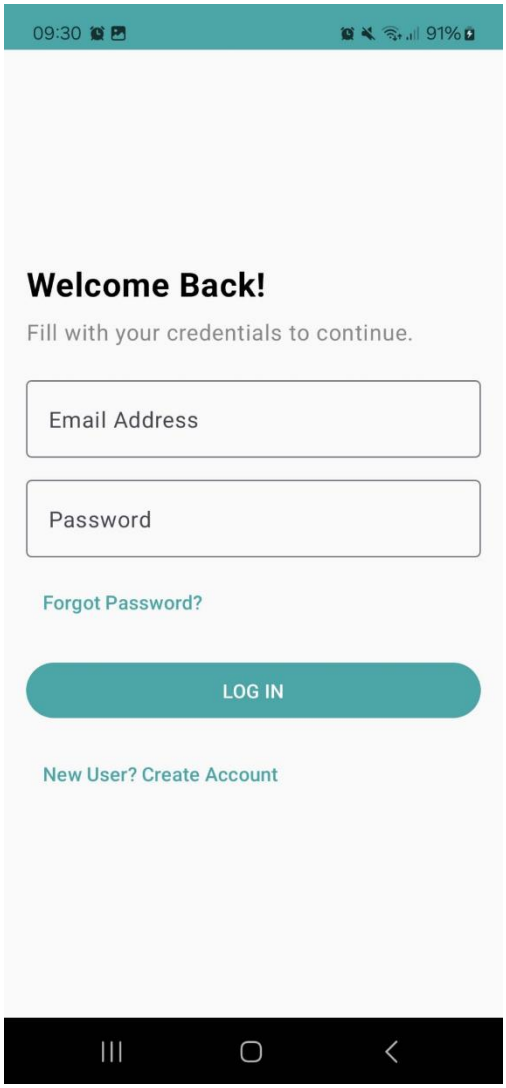
Implemented interactions

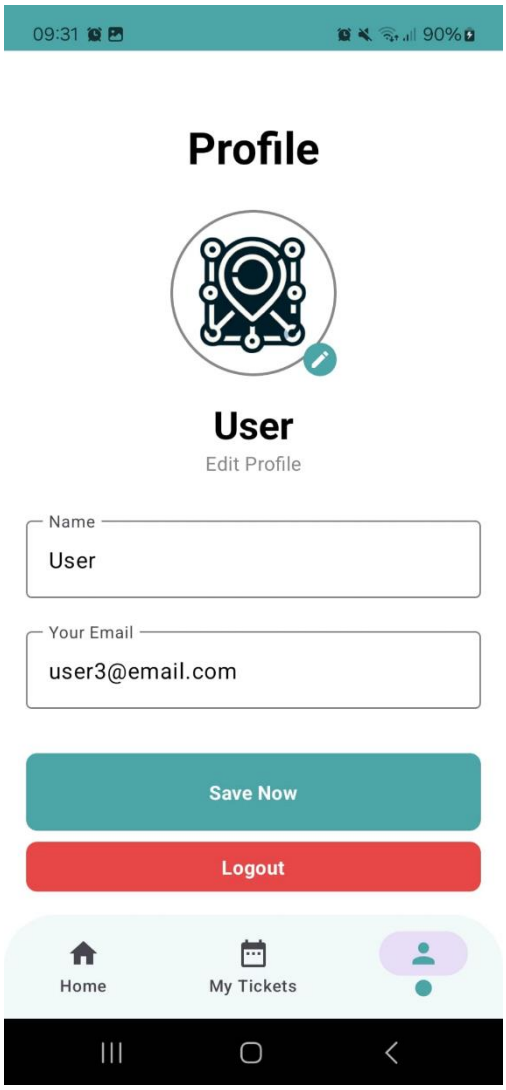
1. Splash Screen



2. Login/Register & Profile

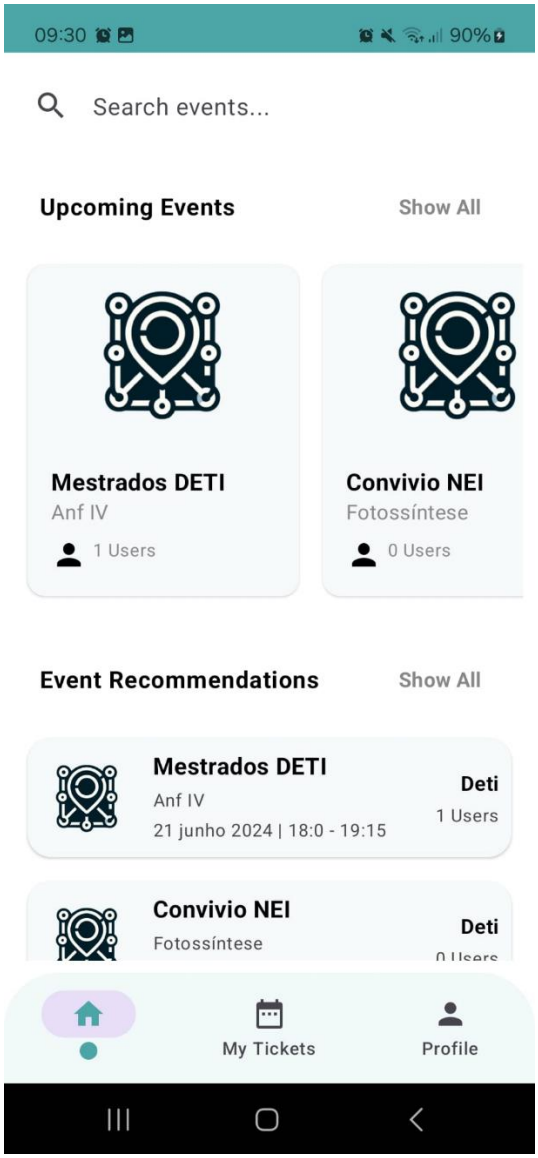
Users can login/register





3. Event Discovery

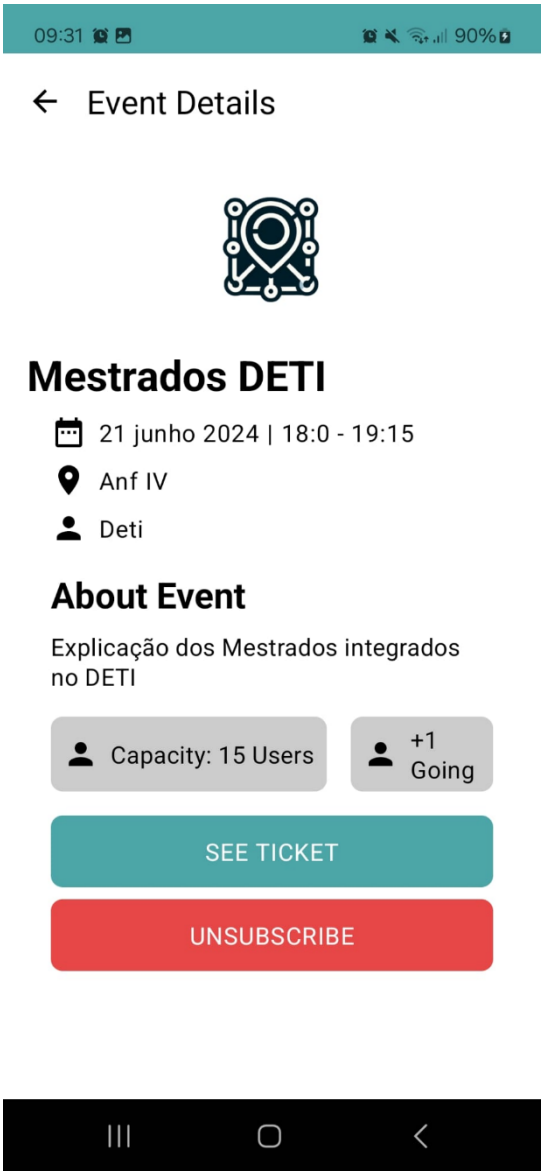
Users can browse upcoming events.



4. Event Registration

Users can view detailed information and after a few clicks they can confirm their attendance.

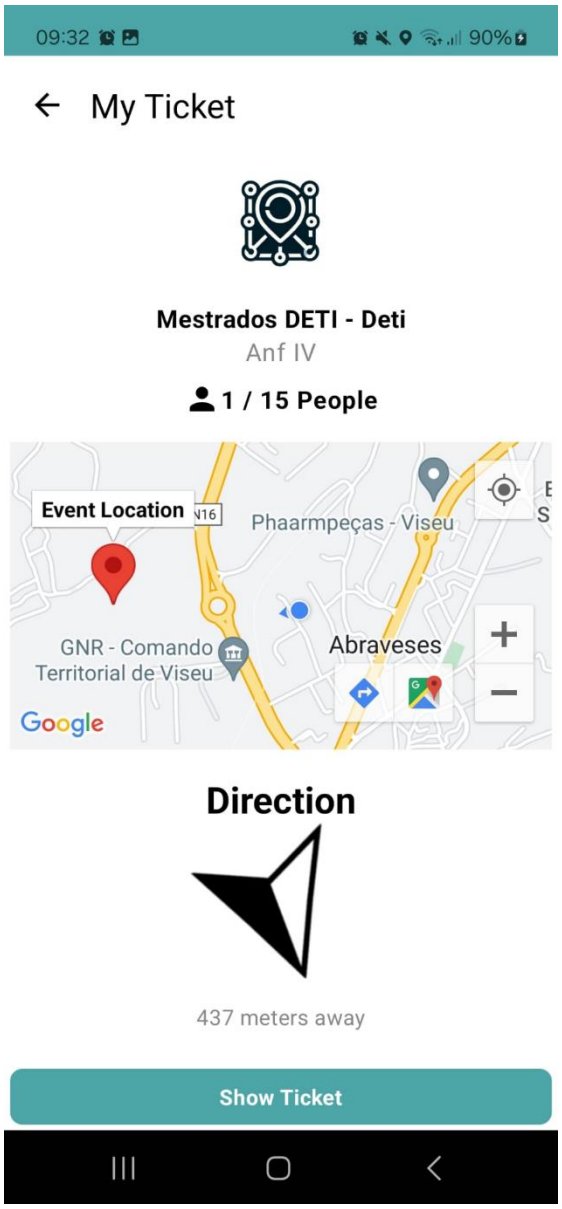
After registering for the event, it is possible to navigate to another page and check the event location by a map and see the ticket via QrCode.



5. Event Location/Ticket

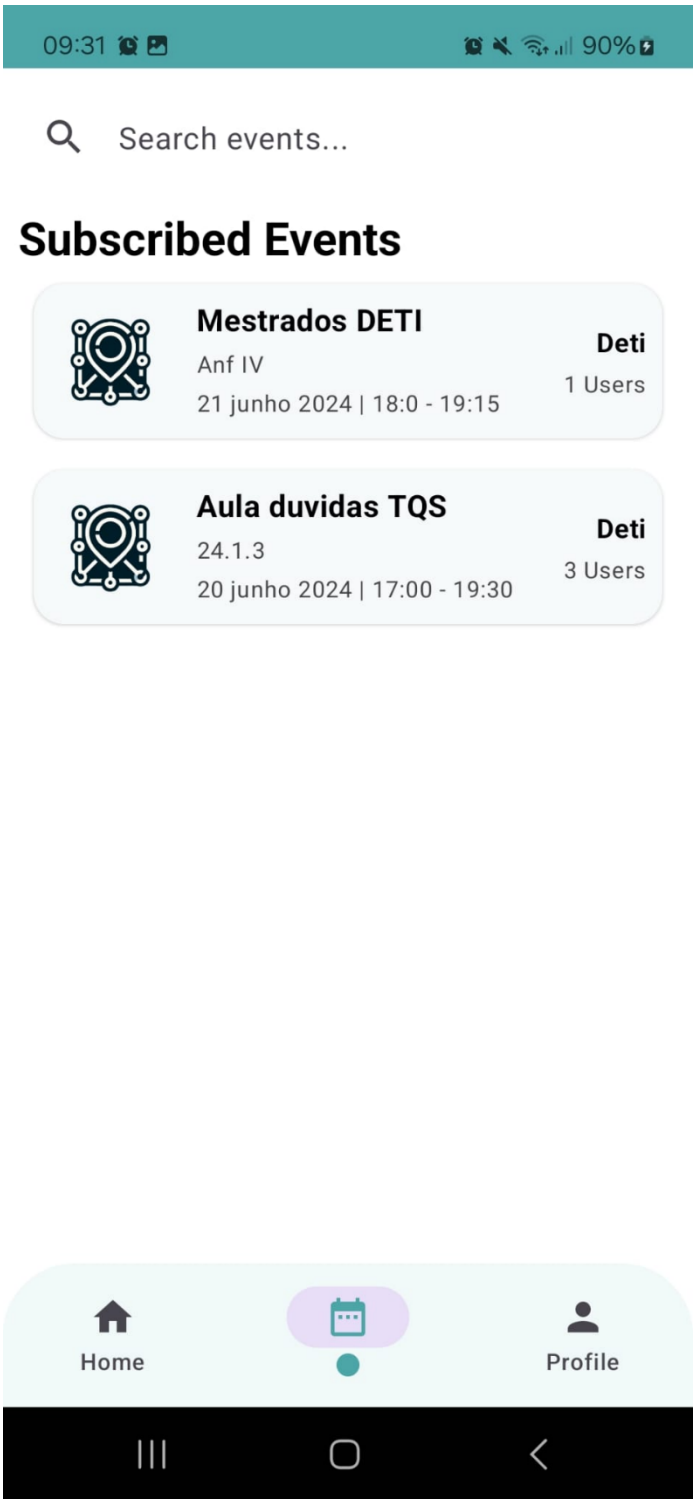
Users can use the map to visualize the exact location of the event, distance between the event and their location but also be guided to the event from their own location.

After reaching the destination User use the QrCode to check into the event.



6. Tickets Management

User can visualize their tickets (events they have registered)



Project Limitations

- **Search Bar Filtering:** The search bar filtering feature, intended to allow users to find events by name or keyword, is not currently functional.
- **Filtering by Category**: The feature to filter events by category (e.g., lectures, seminars) was planned but not implemented.
- **Offline Functionality**: Limited offline capabilities; most features require an internet connection.
- **User Notifications**: Notifications to alert users when an event is approaching were planned but have not been implemented.

New features & changes after the project presentation

None.

3 Conclusions and supporting resources

Lessons learned

- **Firebase Integration:** Managing data through firestore and firebase authentication was a required implementation but fairly simple when completely understood.
- **UI/UX Design**: Designing an intuitive user interface required iterative testing and user feedback to ensure ease of use.
- **Integration with External Services**: Integrating Google Maps and QR code scanning added complexity but greatly enhanced the app's functionality.

Work distribution within the team

Taking into consideration the overall development of the project, the contribution of each team member was distributed as follow: Miguel Miragaia did 50% of the work, and Cristiano Nicolau contributed with 50%.

Project resources

Resource:	**Available at:**
Code repository:	https://github.com/Miragaia/UniEvents
Ready-to-deploy APK:	https://github.com/Miragaia/UniEvents/blob/dev/app-debug.apk
App Store page:	
Demo video:	**https://youtu.be/uurvzu-DSVE**

Reference materials

https://firebase.google.com/docs

https://developers.google.com/maps/documentation