



EE-490 Project 7.A



Seizure Guard

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EL-MA3

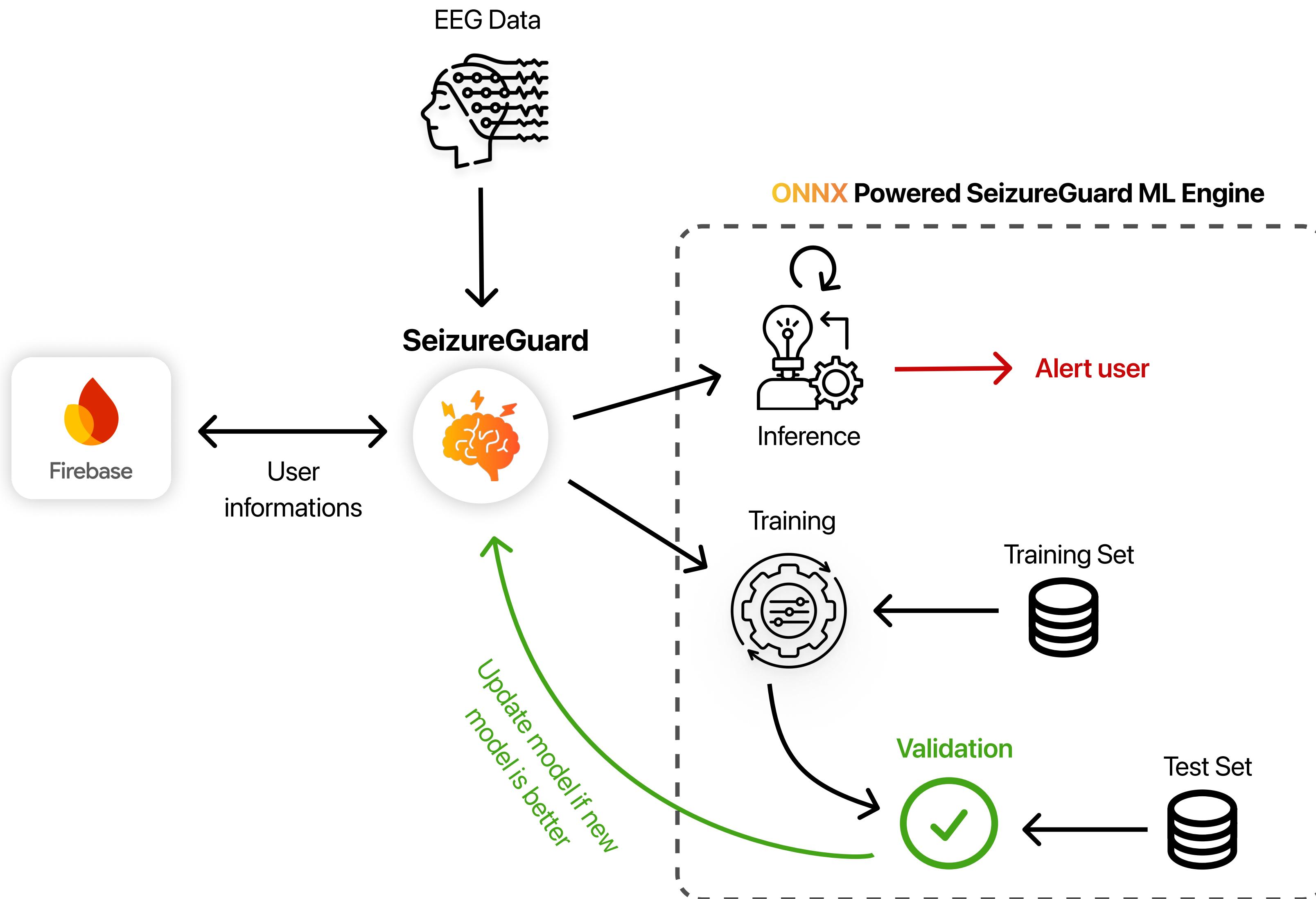
François Dumoncel
SC-MA3



- Real time **AI-based seizure detection** on epilepsy patients.
- Data is taken from an **EEG** sensor worn by the patient.
- **On-device model fine-tuning** using patient's data.
- **High-importance notification** with shortcuts for calling emergency.
- Emergence notification with location sent to all devices in **Parent mode**.
- **Keep track of the history of past seizures** and give insightful statistics.
- Profile management with possibility to **backup seizure history to the cloud**.



SeizureGuard - App Structure



Contribution

François

 Home Screen Widgets

 ONNX On Device Training

 Firebase Profile Management

 Onboarding

 Biometrics Login

 UI / UX Design

Francesco

 Foreground Service

 ONNX Inference

 BLE Client Code

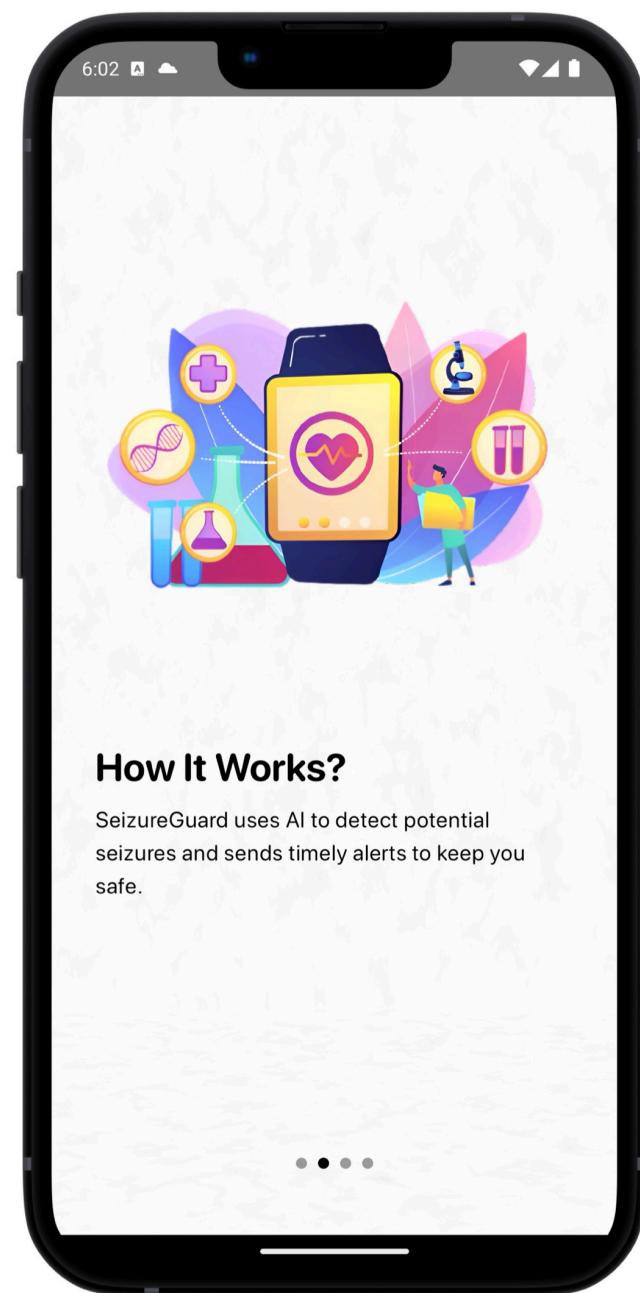
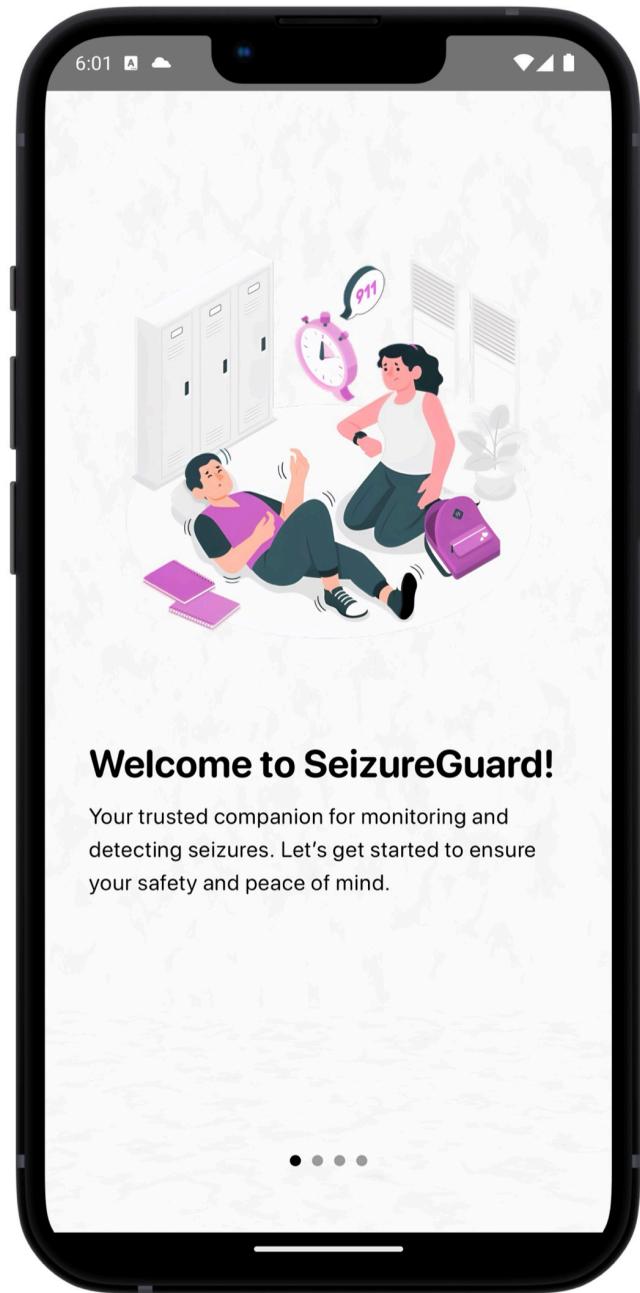
 Parent Mode

 Power modes

 EEG Sensor Simulation

Overall, the balance between workload and difficulty was well-maintained.

 Seamless interaction with **HorizontalPager**



 Profile registration using **Firebase**

 **ViewModel** Pattern

 **Intuitive** and **clean** UI to register fast

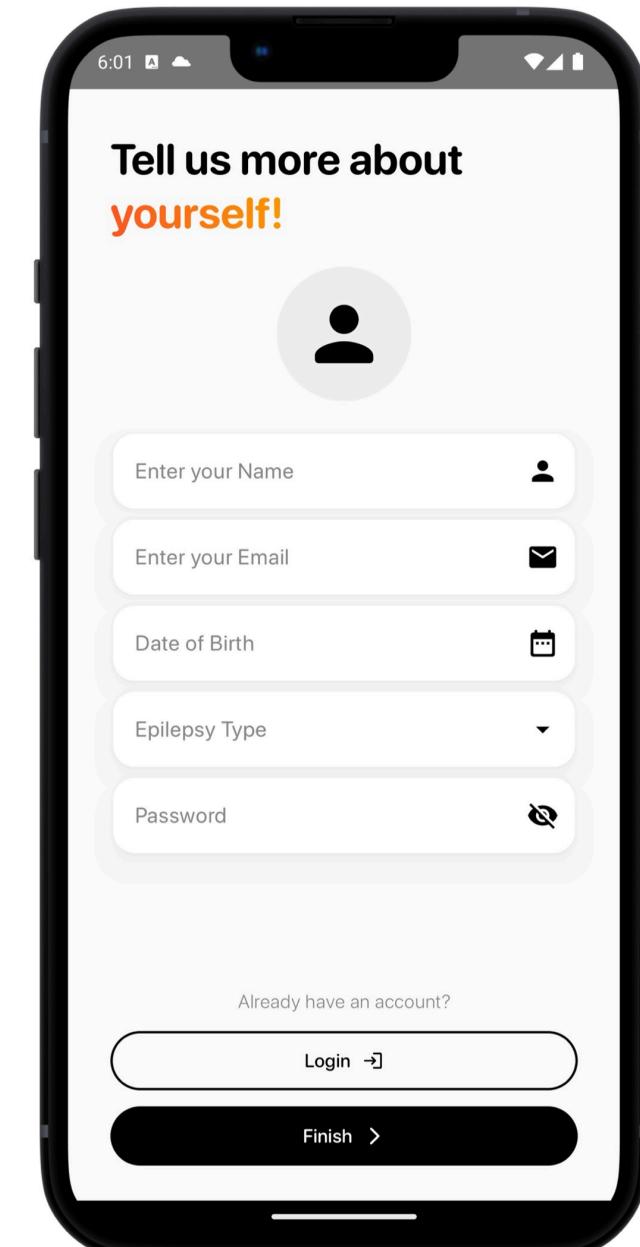
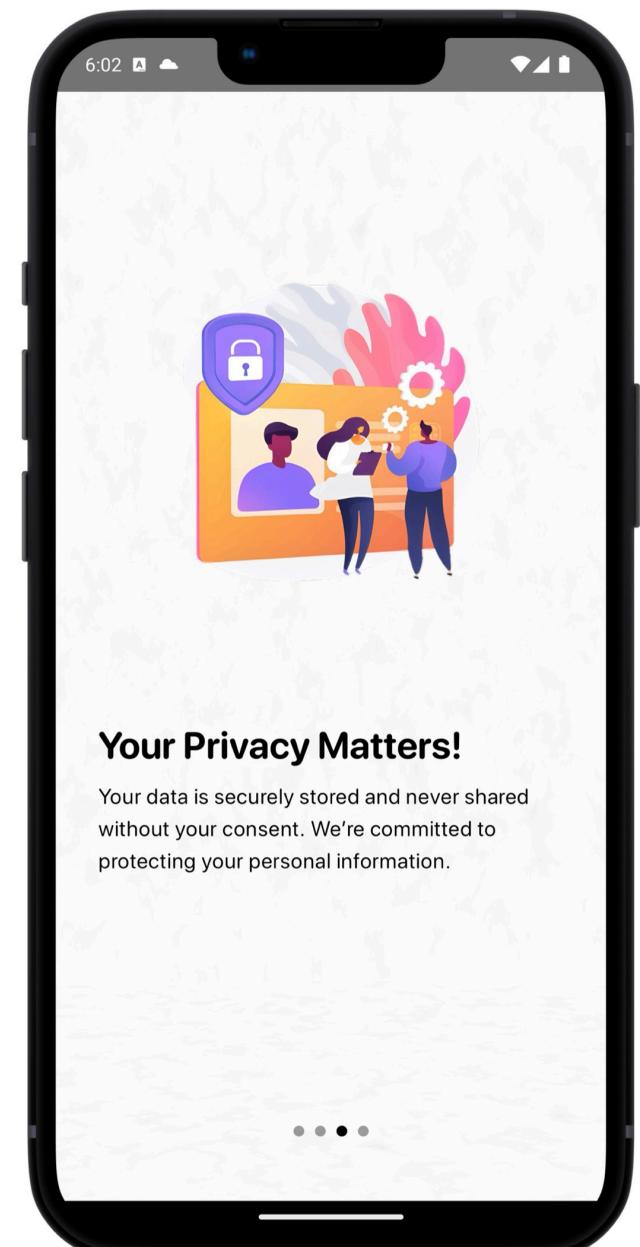
 Inform the user about **AI** and **privacy**

User can login swiftly but...

 Password are stored in clear

 No secure authentication

 Use **biometric!**



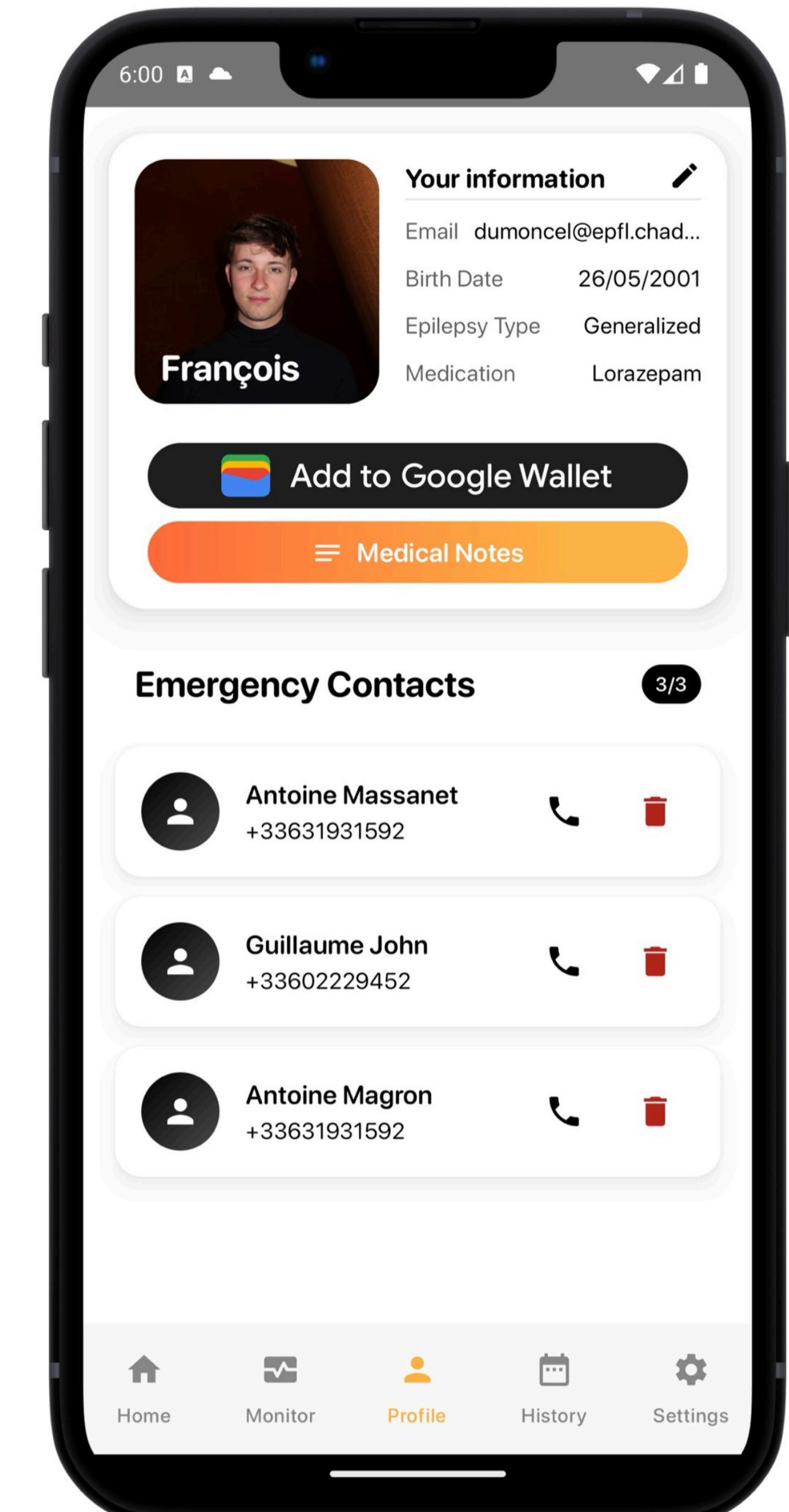


DataStore



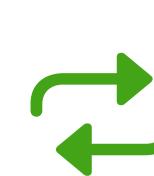
Firebase

- ViewModel and Repository pattern.
- **data class Profile** is the core data model that represents all user information.
- **ProfileViewModel** is the central manager for all data operations through direct communication with the **ProfileRepository**.
- **ProfileRepository** manages both local (DataStore) and cloud (Firebase) storage. Single source of Truth (SSOT) using the singleton Pattern that ensures unique instance.
- Google Wallet API** is used to provide medical card access anywhere.



EPFL Inference & Training

Predicting seizures based of EEG data is the **core** of the SeizureGuard!



To perform inference and training even with the app closed, we used a **ForegroundService**.



Data taken via **BLE** notifications from an **EEG sensor**.



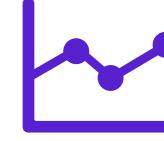
Fine-tuning is user-enabled and can be done after a certain amount of data has been acquired.



Device communicates desired sample rate to EEG sensor with different **power modes**.



Real time **validation metrics** to inform the user.



Real time monitoring with interactive **EEG Graph**.



EPFL Parent Mode



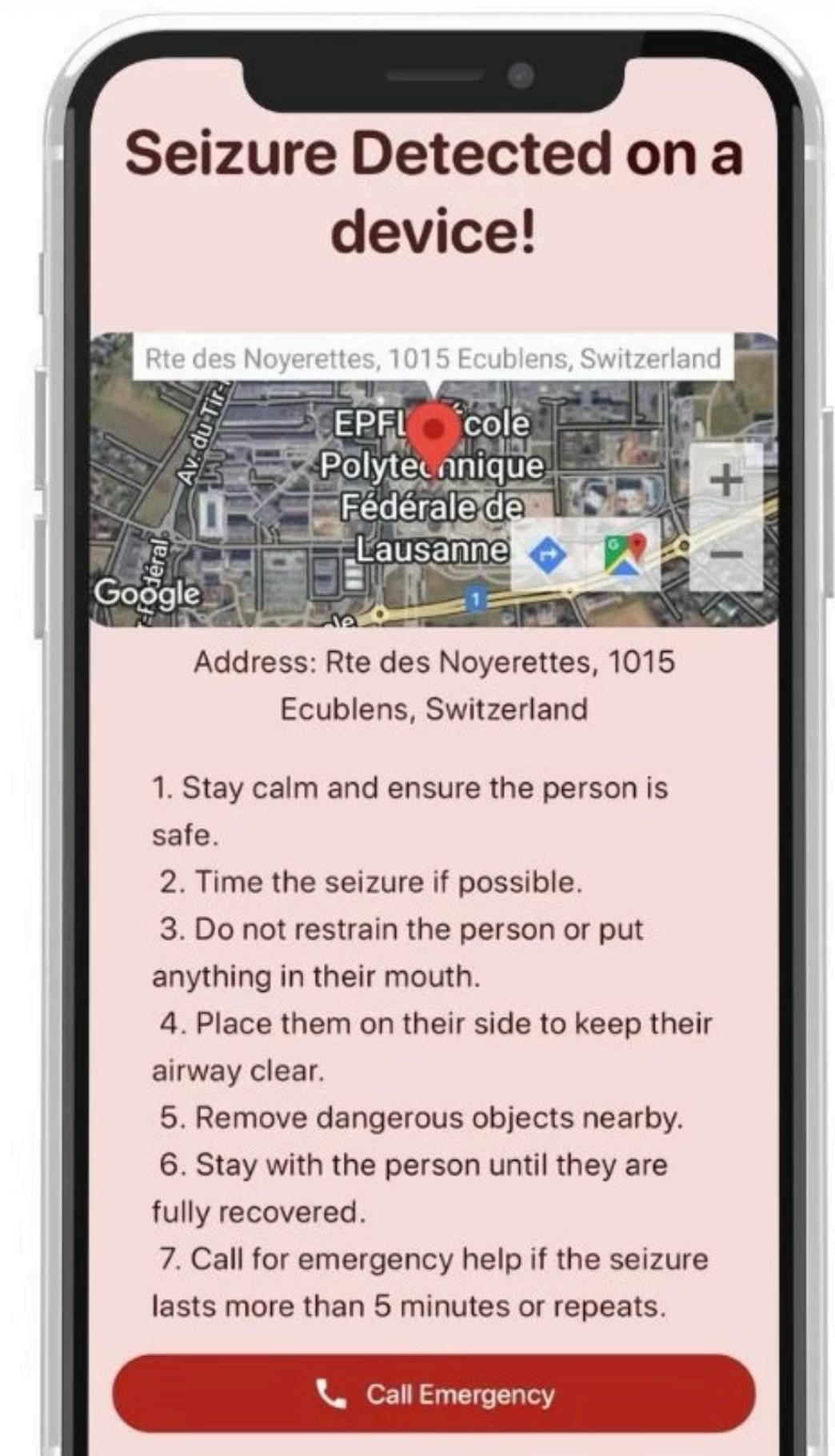
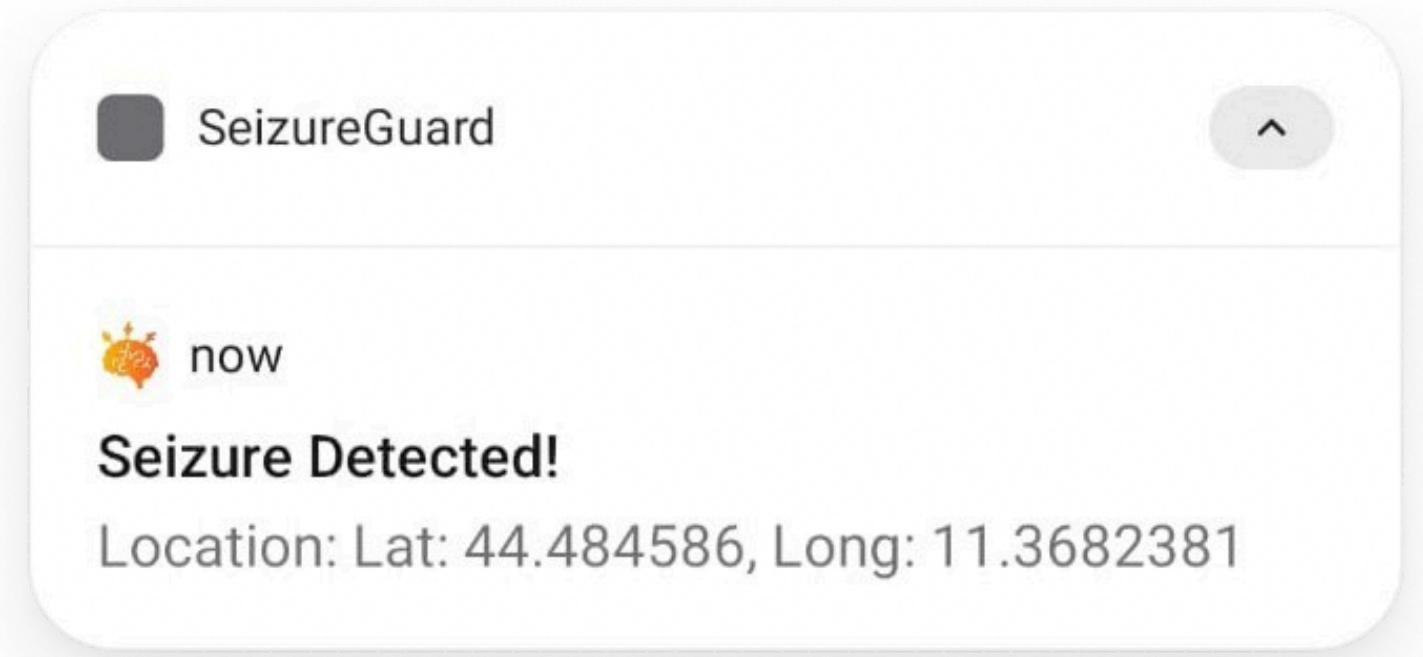
A device in the profile can switch to parent mode to get notifications **when seizures are detected in other devices**
→ Allows a caregiver to follow a patient.



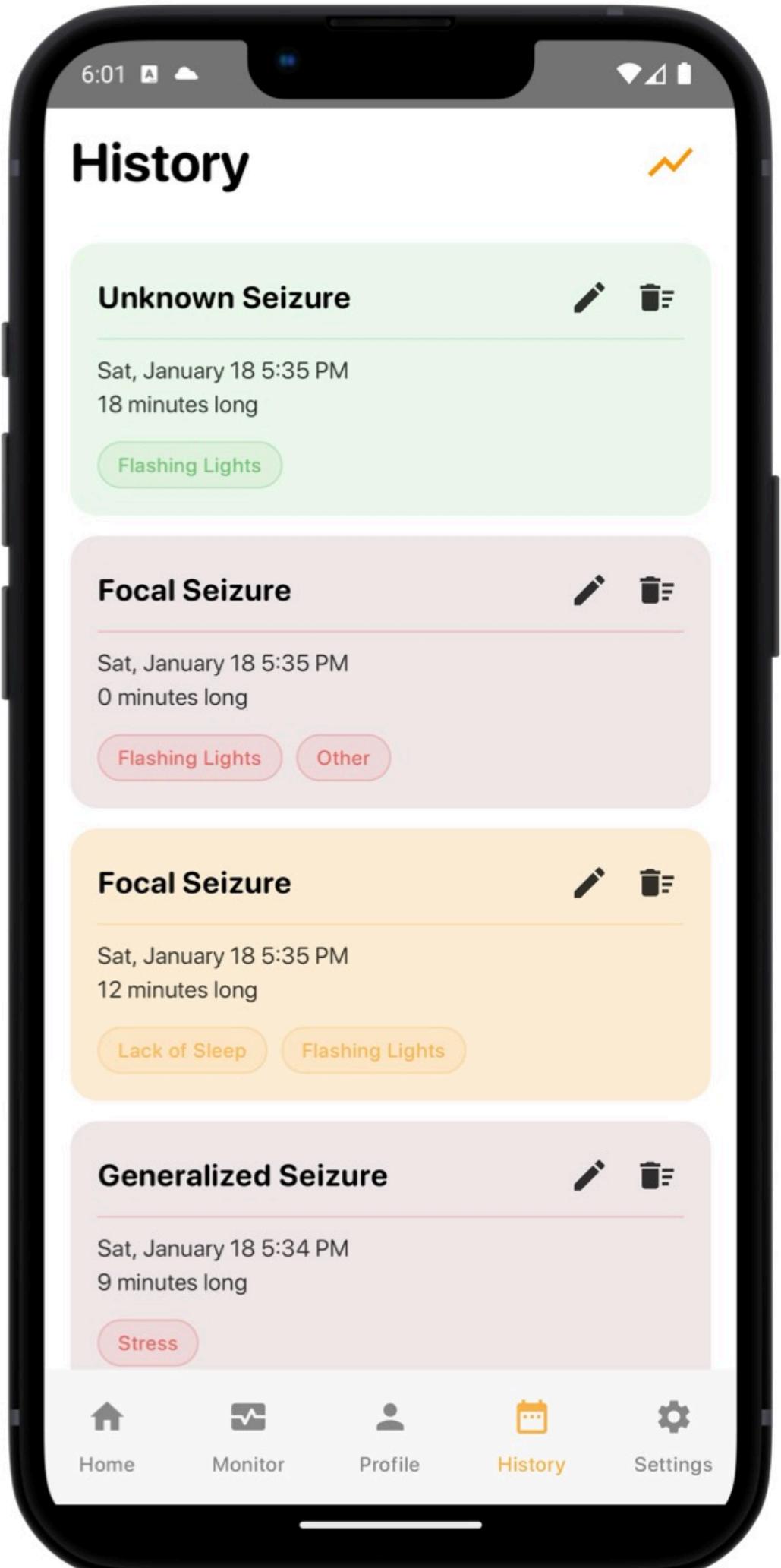
Notifications sent through **Firebase Cloud Messaging API**.
All **FCM tokens** of logged in devices saved in profile to receive notifications.



Seizure location retrieved via **Google Maps API** added to the notification payload.



EPFL History & Statistics



@Composable
LazyColumn, SeizureCard or
EmptyHistoryMessage if no data.

One card per seizure, the color of the card indicate the **severity of the seizure** on a scale from 1 to 5.

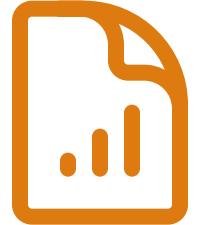


ProfileViewModel holds the data of all past seizures events.

Possibility of **editing** and **deleting** an event. All of data pass through the **ProfileViewModel** and are persisted by the **ProfileRepository**.

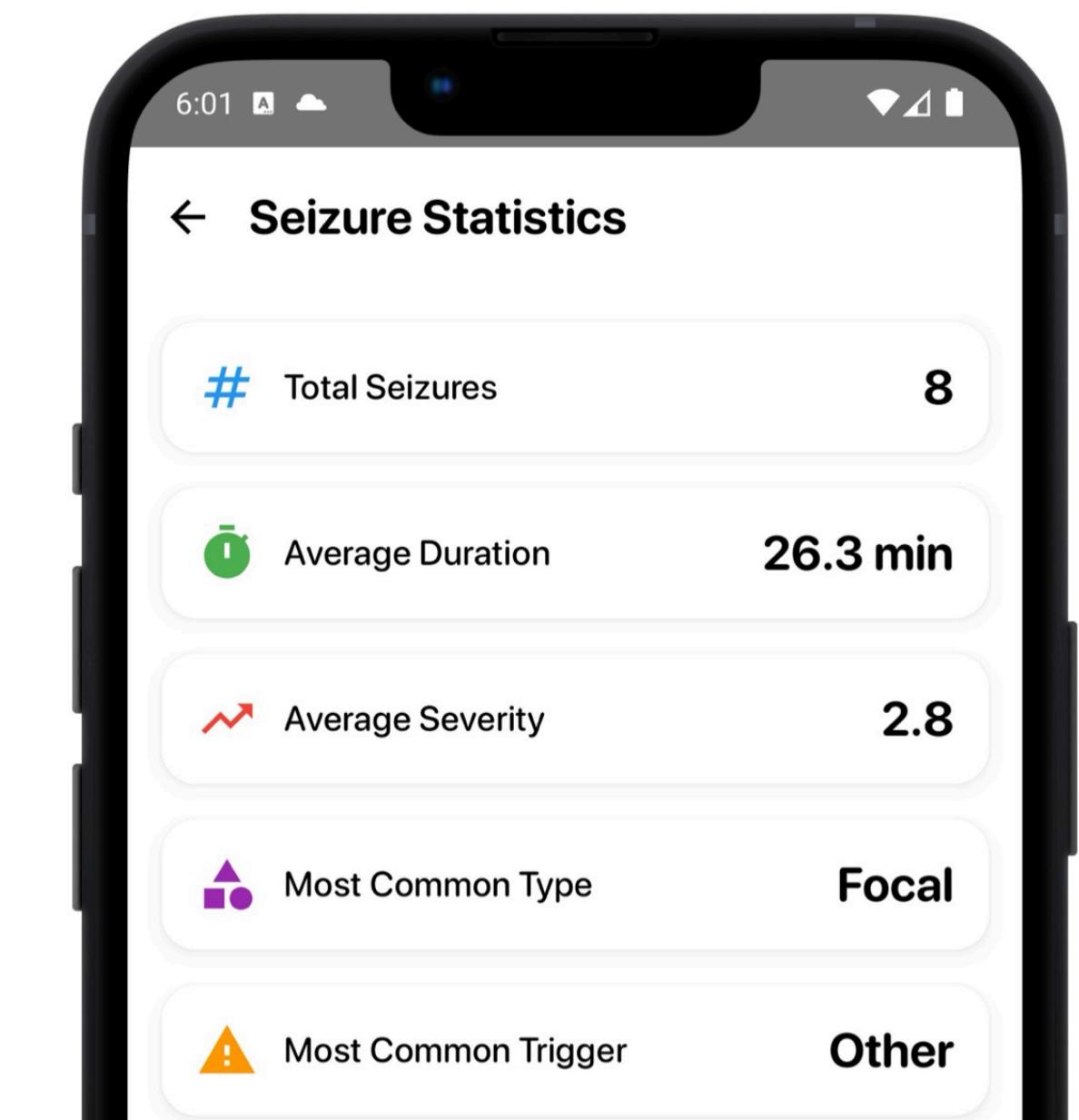
Simple Statistics

LazyColumn of StatCard.



All stats are computed with the past seizures.

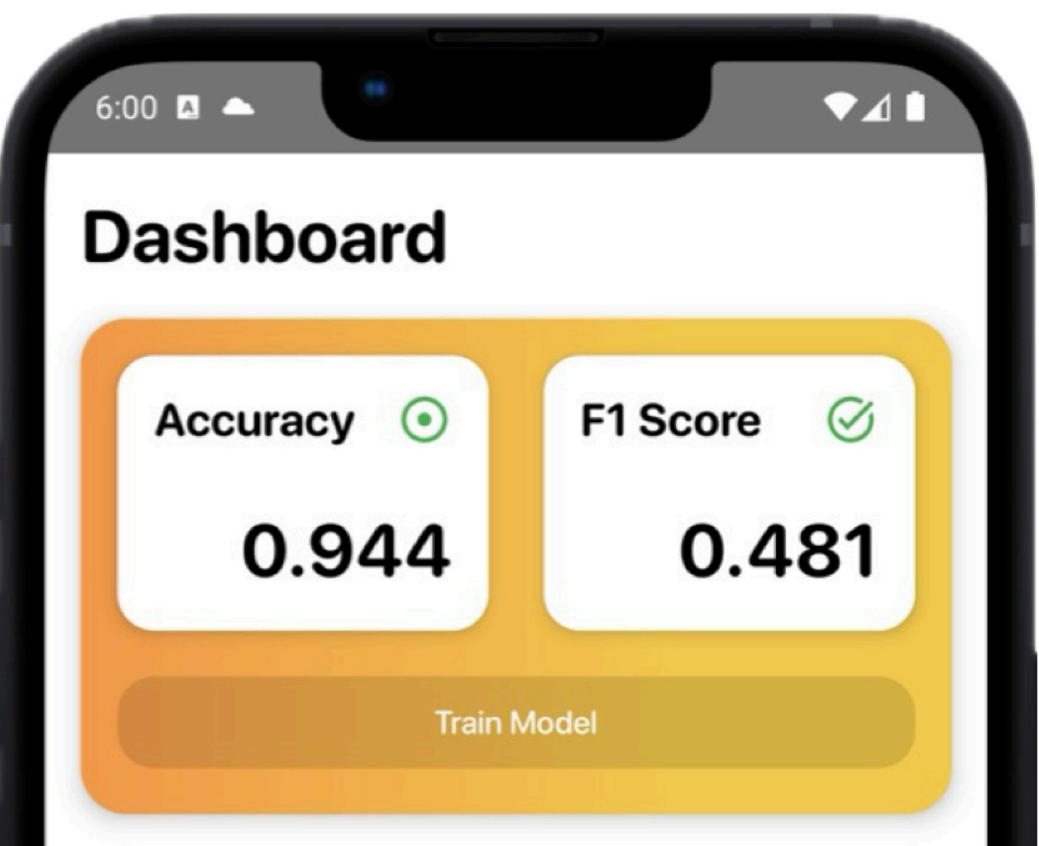
Can be **easily augmented** with other statistics and graphs.



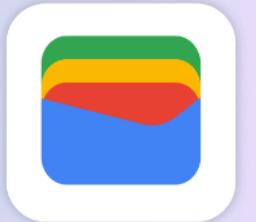
In App Statistics



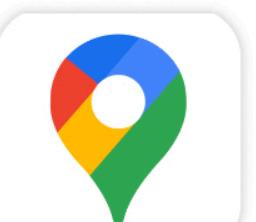
AI-Powered Seizure Detection



Biometric protected



Wallet Integration



Parent Mode



Seizures 8

Home Screen Widget

Real Time EEG Monitoring



Medical Notes



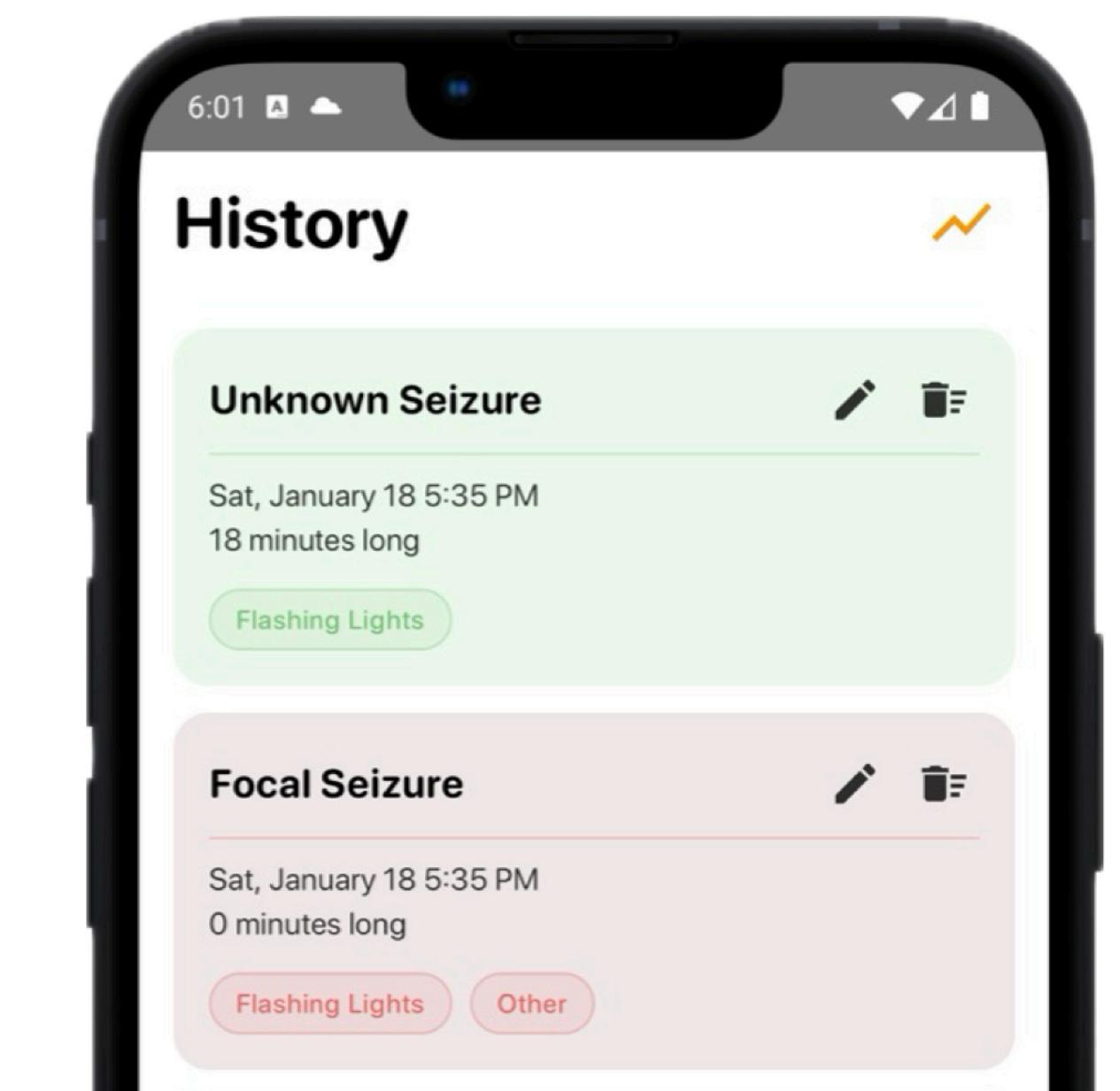
Neurology Consultation
18/01/2025



Consultation with Dr.Smith. Keppra dosage adjusted to 1000mg/day. Seizure are less frequent but more intense. Next appointment in 3 months

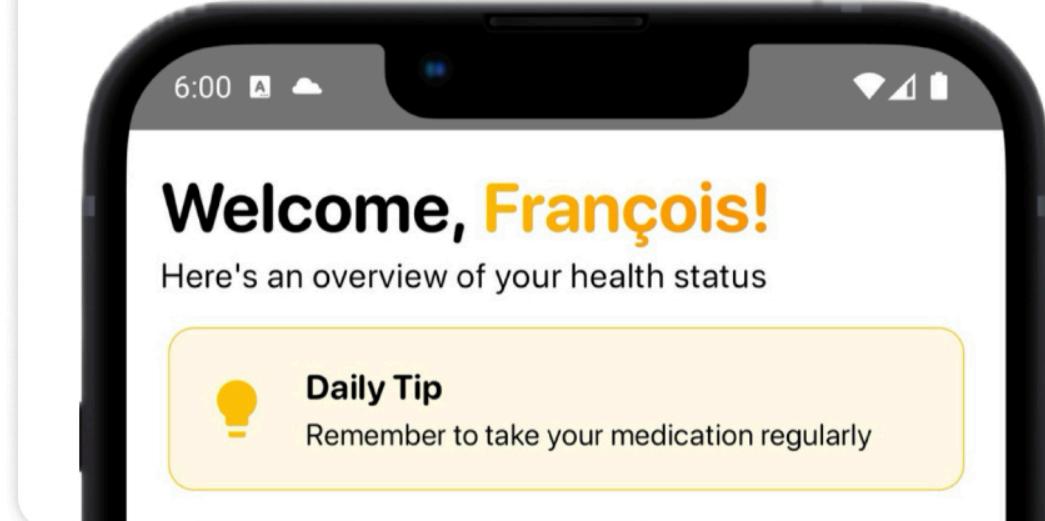
Don't forget anything!

Logging and Tracking of Seizures



Home Screen Widget

Daily Advice



On-Device Training



Firebase Integration