Smart Jugs

Mobile Dev - Project

Authors

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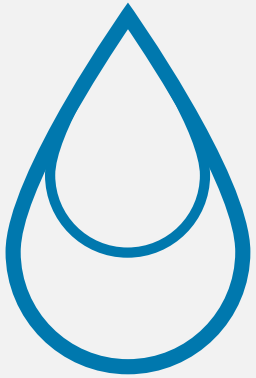
Overview

- Our project involves the connectivity of “Smart (Water) Jugs” (the sensor) and the tracking of the fluid filtered each second.

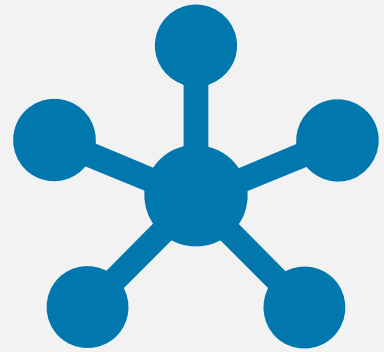
- We track:
  - The total number of liters filtered
  - The amount of water consumed each day
  - The filter usage
  - The kilograms of plastic saved
  - The location



- Coupled with a hardware sensor developed in parallel with the **Internet of Things** course.

Technologies

- The application needs:
  - **Wi-Fi** technology to work properly. Indeed, it is used to pair, to retrieve sensor data, perform login/registration, to manage account information and to collect data for aggregated data analysis by vendors.
  - **GPS** to collect location, transmitted without any other user information. This can be decided to be shared or not by the user.



- The application is implemented in **Kotlin** via **Android Studio**, we use **Room Database** to handle local storage.

- For handling HTTP requests and responses we used the **Retrofit** library.

- Any operation that needs to check the owning of a jug is done by a **JWT token** verification server-side, that is given upon a successful login.

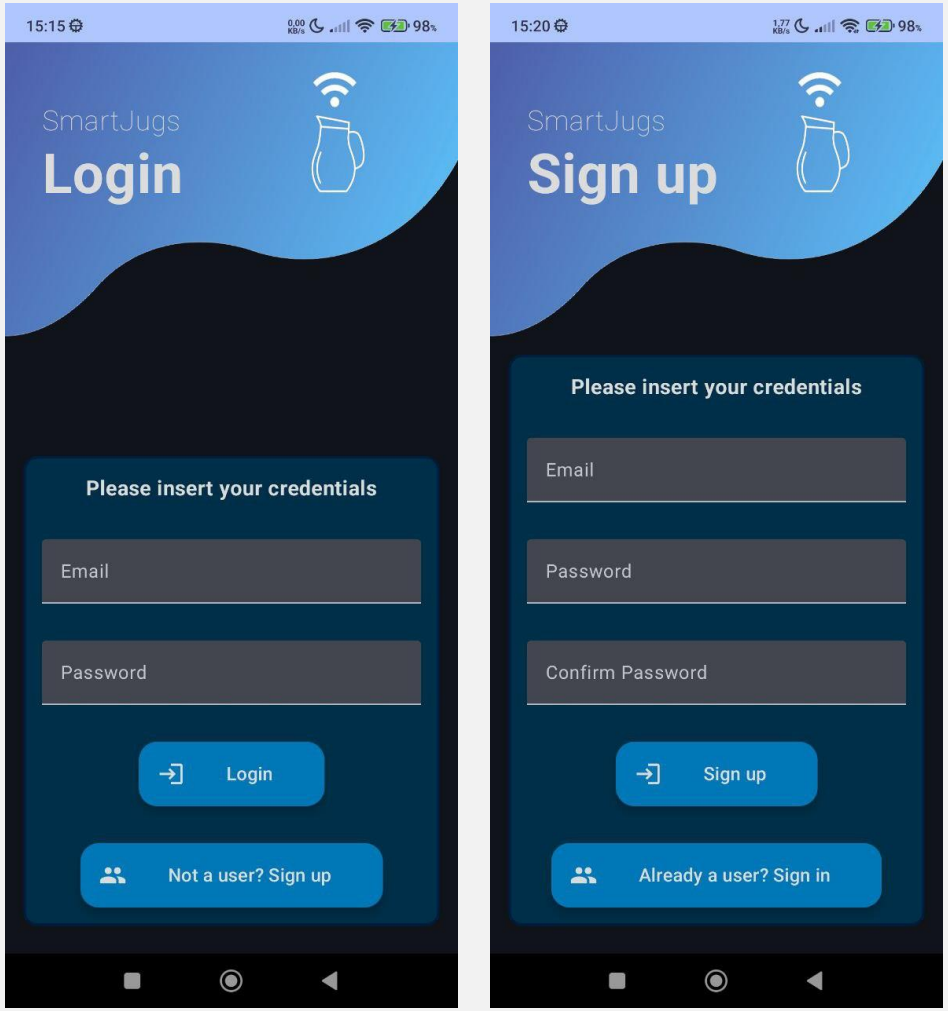
- The layout and design graphics are implemented in **Jetpack Compose**, utilizing **View Models** and **Flows**.

Login / Registration

- The one on the left (Login page) will be the **first page** shown when the app opens (if not already logged), to continue in the app the user must provide their credentials.

- On the right, instead, the user can sign in if has no account

- To make the application work, a **Wi-Fi connection is needed** to connect to the remote server with the database that contains the login information.



Dashboard

- This page shows all the information sent by the jug sensor, if at least one is paired.
- To know which jug has been selected, we show its name on the very top, under the navigation bar.
- The dashboard shows also, in the bottom part, a percentage of **the filter usage**, alerting with a red color if the filter is almost exhausted.
- The user can also click on the bottom button to **buy a filter**, this will redirect him to an online web search.

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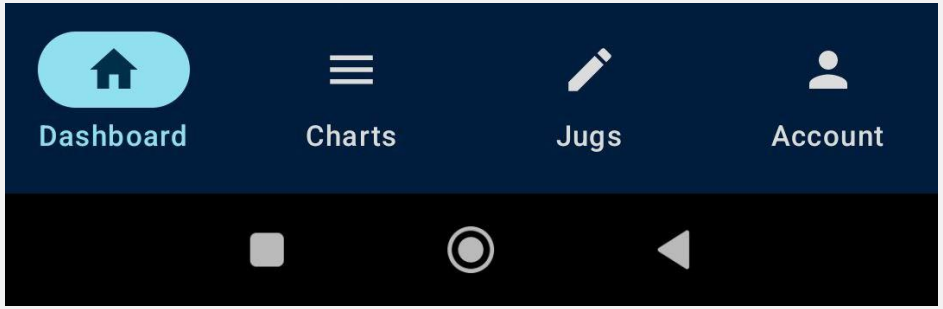
Navigation

Top-bar

We provide a top navigation bar with which the user can navigate to the previous page through the **arrow-back** icon, for pages where it is needed. Also the news feed can be reached from here

Bottom-bar

We provide a bottom navigation bar with which the user can navigate through the app and see other **sections** from jugs information / list to account management.



Charts

This view shows two charts about the water consumption respectively:

- in the **last hour**, so each minute the information is retrieved (excluding the current minute)
- in the **last week** (including the current day)

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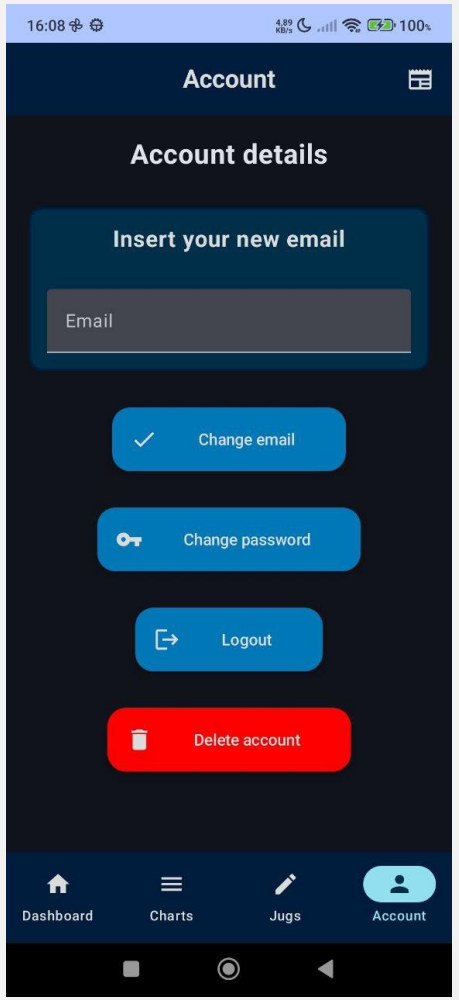
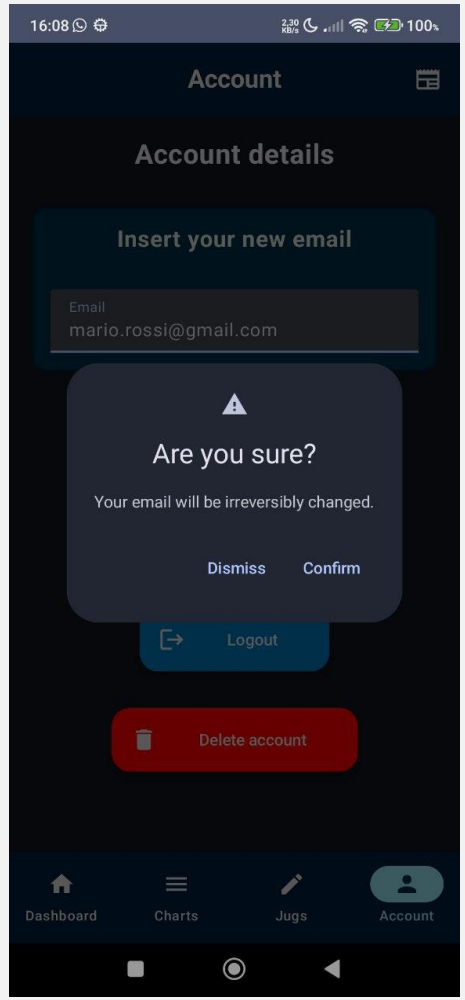
Account management

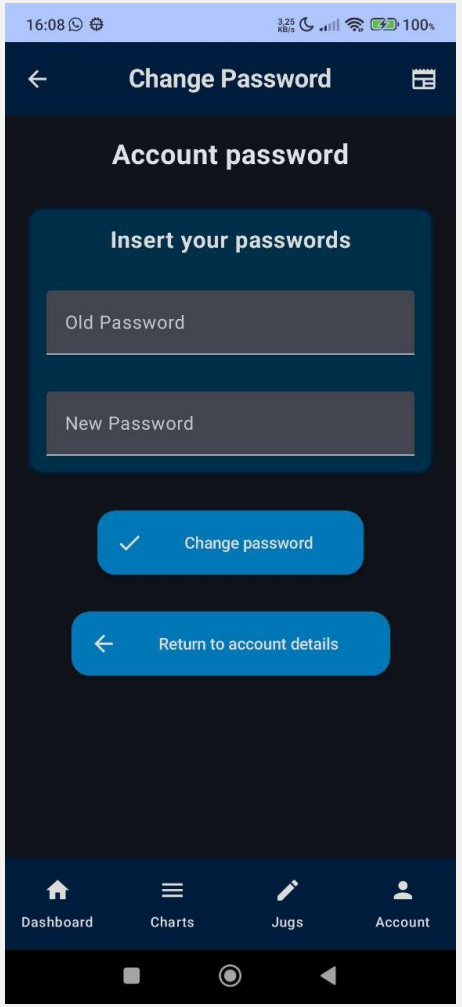
- In this page the user can **change their email** by editing the field, clicking the “Change Email” button and confirming the **alert dialog** pop up.
- By clicking on the “Change password” button the user will be redirected to the “Change Password” page.
- By clicking the “Disconnect” button the user will be disconnected.
- By clicking the “Delete account” button the user will be disconnected, their credentials and their jugs information deleted.





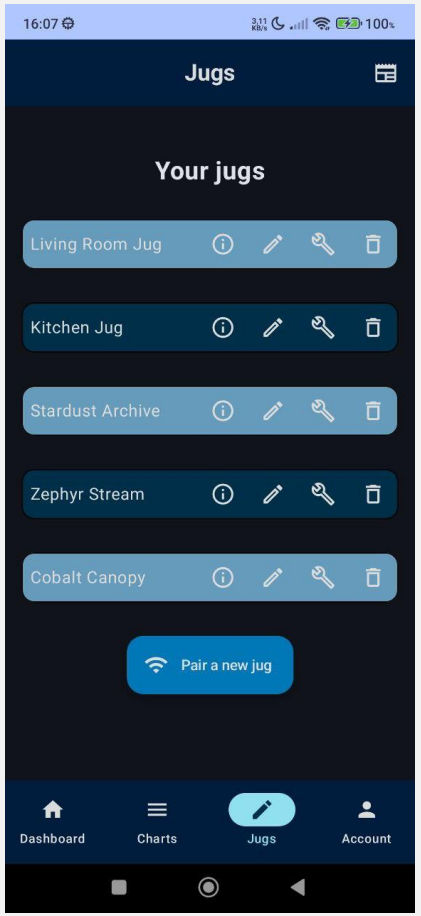
Change password

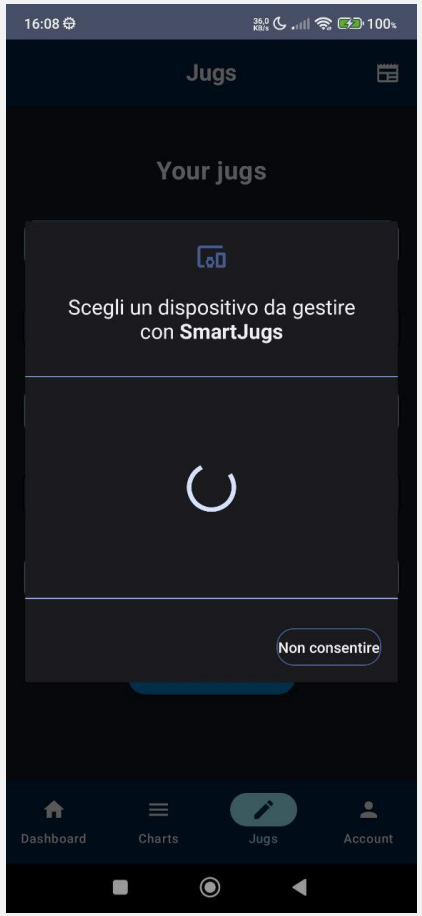
- In this page the user can edit the password fields to **change their password**.
- By clicking the “Change password” button an alert dialog pops up requesting a confirmation; by confirming this, the dialog closes and the password is updated.
- If the old password is not verified the password does not change and a **toast** appears to notify the user.



Jugs management

- In this page the user can review the owned jugs or pair new ones via Wi-Fi.
- This Wi-Fi will be **hosted** by the jug devices themselves and the process of searching can be started by clicking the button “Pair a new jug”.
- By clicking on the Information icon, the user will be redirected to the Dashboard, displaying the information about the selected jug.
- By clicking on the Edit icon (pencil), the user will be prompted with a dialog in which they have to provide a new name for the jug.
- By clicking on the Settings icon, the user will be prompted with a dialog in which they have to provide a new filter value for the jug, this emulates the changing filter of the jug.





News Feed

- As an extra functionality, we also inserted a news feed, updated in **real-time**.

- In this page the user can review the latest notice world-wide about the water, to stay connected.
  The website we refer to is
  https://www.unwater.org/news.

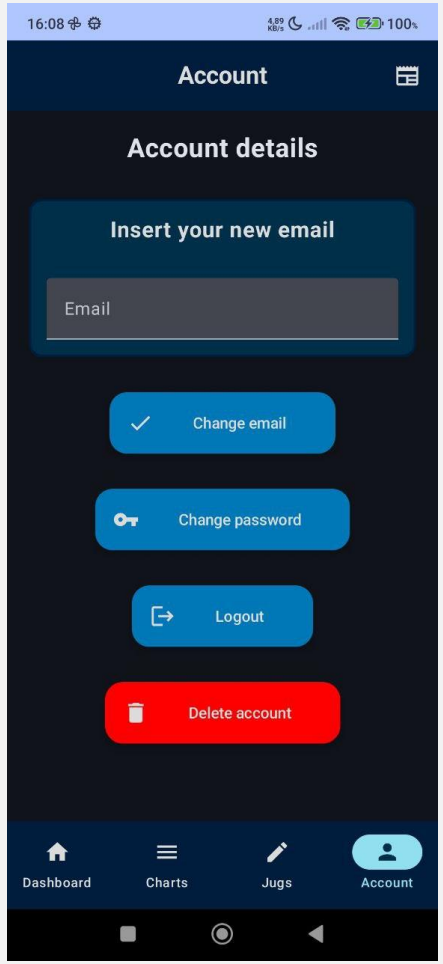
- Clicking the arrow-back, will bring the application to the previous page viewed, whatever it was.

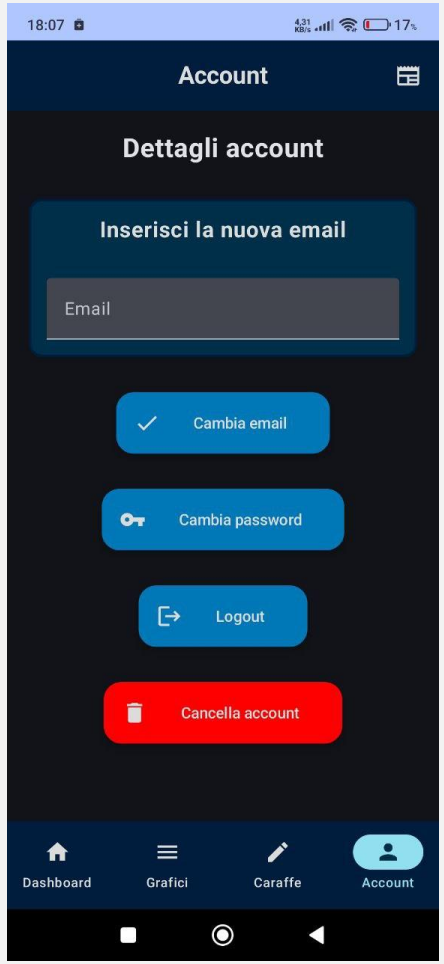
Other functionalities

Translation

Depending on the user's system language, the application currently supports the following languages:

- **English** (Default)
- **Italian**





Other functionalities

Push notifications (Firebase)

- When the filter usage has almost reached the limit (about 80%), the application will send a notification with a warning about a certain jug.

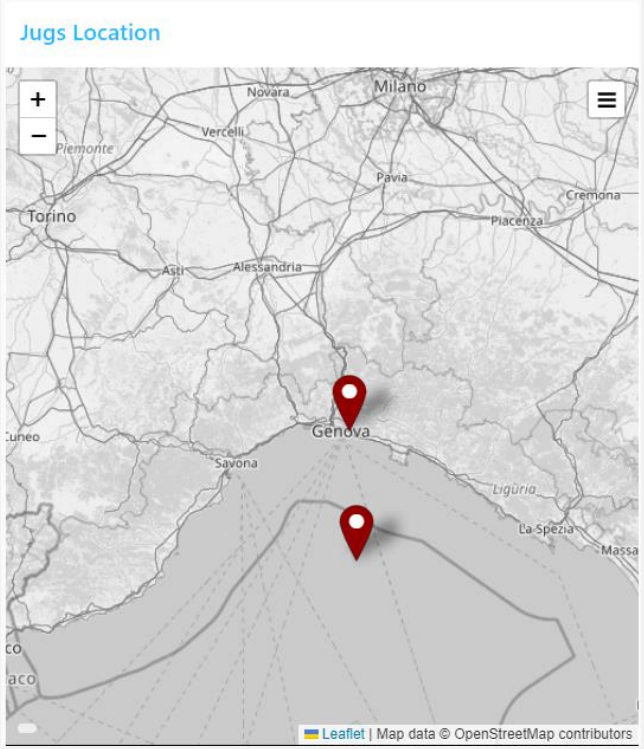
- By clicking on the notification, the application will open directly on the dashboard of the interested jug.

- The notification system is based on **Google Firebase**

Other functionalities

GPS Localization

- We make the user choose if they want to share their position that is sent in an aggregated form to the company (in particular just coordinates and name of the jug is sent)
- The effective sharing is performed upon successfully pairing.
- The user can choose both to share a **precise** (upper case) or **approximate** location (bottom case) or not to share at all. Original position showed on the map was the DIBRIS (University of Genova)



This map is taken from the SmartJugs employee dashboard: it is not provided to client nor to the mobile application.

Privacy of the user

- The jugs sensor data will be sent over **Wi-Fi** to the vendor server, in an aggregated way.
- Locally we use the **Room database** to save a userID and a token for authenticate any operation with their jugs.
- The only user data that will be saved on the vendor servers are their **credentials** (to handle login) and their associations with their jugs to properly display the dashboard for each owned jug.
- No other mobile device information is gathered and transmitted except for the **location** that can be chosen if to be shared or not.
- The permission that will be asked to the user upon the start of the application will be:
  - The first one is about the **location**. The user can choose both to share a precise or approximate location or not to share at all.
  - The second one is about **notifications**: the user can choose if they want to receive notifications. Those notifications involve just the alert if a filter is almost exhausted.

Differences w.r.t proposal

- The user **registration** and **login** have been separated in two different pages, to have a cleaner interface
- Improved the **Dashboard** page, substituting the idea of the cylinder as status with a cleaner view: the percentage is put into a card that **changes color into red** if the usage of the filter is above a certain amount.
- The idea of sidebar navigation has been replaced with **a bottom bar** navigation. **A top bar** has been properly implemented.
- We slightly varied the charts, by using both **line** and **bar** plots.
- A cleaner look has been put into the Account and Password management page, giving the user a better overview, with icons, of which button do what.
- The management of the jugs has now **more actions** that can be performed on each jug.
- Since a new functionality was suggested to be added, we decided to **introduce a news feed** about information world-wide on the water topics.

Thanks for your attention