

FITPULSE

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1 Introduction

This report presents an in-depth analysis of a project undertaken for the course "Computação Móvel." The primary goal of this project was to develop a mobile application using Flutter that addresses a specific problem within the domain of mobile computing.

In the following sections, we will explore the motivation behind the project, delve into its implementation and architecture, and highlight its key features.

2 Motivation

The development of FitPulse is driven by the growing demand for accessible and user-friendly health and fitness tracking solutions. In recent years, public awareness around personal health, physical activity, and wellness has surged, supported by advancements in mobile and wearable technologies. FitPulse aims to provide users with a seamless, integrated platform to monitor essential health metrics—such as heart rate, calories burned, step count, and distance—directly from their mobile device and smartwatch.

A unique feature of FitPulse is the ability to compare fitness stats with friends, fostering a sense of community and friendly competition. By enabling users to generate and scan QR codes containing workout data, the app allows them to easily share and compare metrics, adding a social layer to individual fitness tracking. This feature not only motivates users to reach their personal goals but also encourages them to engage and connect with others in a fun and interactive way.

3. Solution

To create a user-friendly experience in our application, we began by carefully planning the structure and flow of the user interface on both the smartphone app and the smartwatch app. During this stage, we identified and prioritized the core features essential for delivering a seamless fitness tracking experience. The following features emerged as the Foundation for both of the applications:

Smartphone App:

- **Login and Registration Page:** Users have the option to log in if they already possess an account or to register as new users to gain access to the app's features.
- **Main Page:** This page offers a comprehensive overview of key health metrics, including step count, heart rate, burned calories, and water intake. Users can also see their steps record of the previous 7 days and set daily goals for calories and distance.
- **Map Page:** Displays a map with the user's current location and allows them to start tracking a route.

- **Compare Page:** Allows users to generate or scan a qr-code with their health metrics that will be used to generate a page of comparing the metrics of the two users.
- **Activity Page:** Displays the history of steps, calories burned, and distance for the previous days, allowing users to track their activity levels and monitor their progress over time.

WearOs App:

The Wear OS app provides users with a convenient and efficient way to monitor their health metrics directly from their smartwatch. It displays essential data, including heart rate, step count, calories burned, and distance traveled. Designed for standalone use, the app does not require a connection to a smartphone to function, allowing users to track their fitness on the go.

4. Features

1. WearOs Compatibility

FitPulse is fully compatible with Wear OS, ensuring that users can effortlessly access their health metrics on their smartwatch. This allows for a seamless experience between the smartphone and smartwatch apps, encouraging users to monitor their fitness data anytime, anywhere.

2. Broker (MQTT) for data transmission:

To facilitate real-time data communication between devices, FitPulse utilizes MQTT (Message Queuing Telemetry Transport) as its messaging protocol. This lightweight broker efficiently transmits health metrics between the smartphone and smartwatch, ensuring that users receive timely updates on their fitness data.

3. Sensor integration:

FitPulse seamlessly integrates with various sensors to collect accurate health metrics, including heart rate monitors, accelerometers, and pedometers. By leveraging these sensors, the app provides users with precise data on their physical activities and overall health.

4. Map and Route Recording:

The FitPulse app includes a built-in map feature that displays the user's current location and allows them to track their routes during outdoor activities.

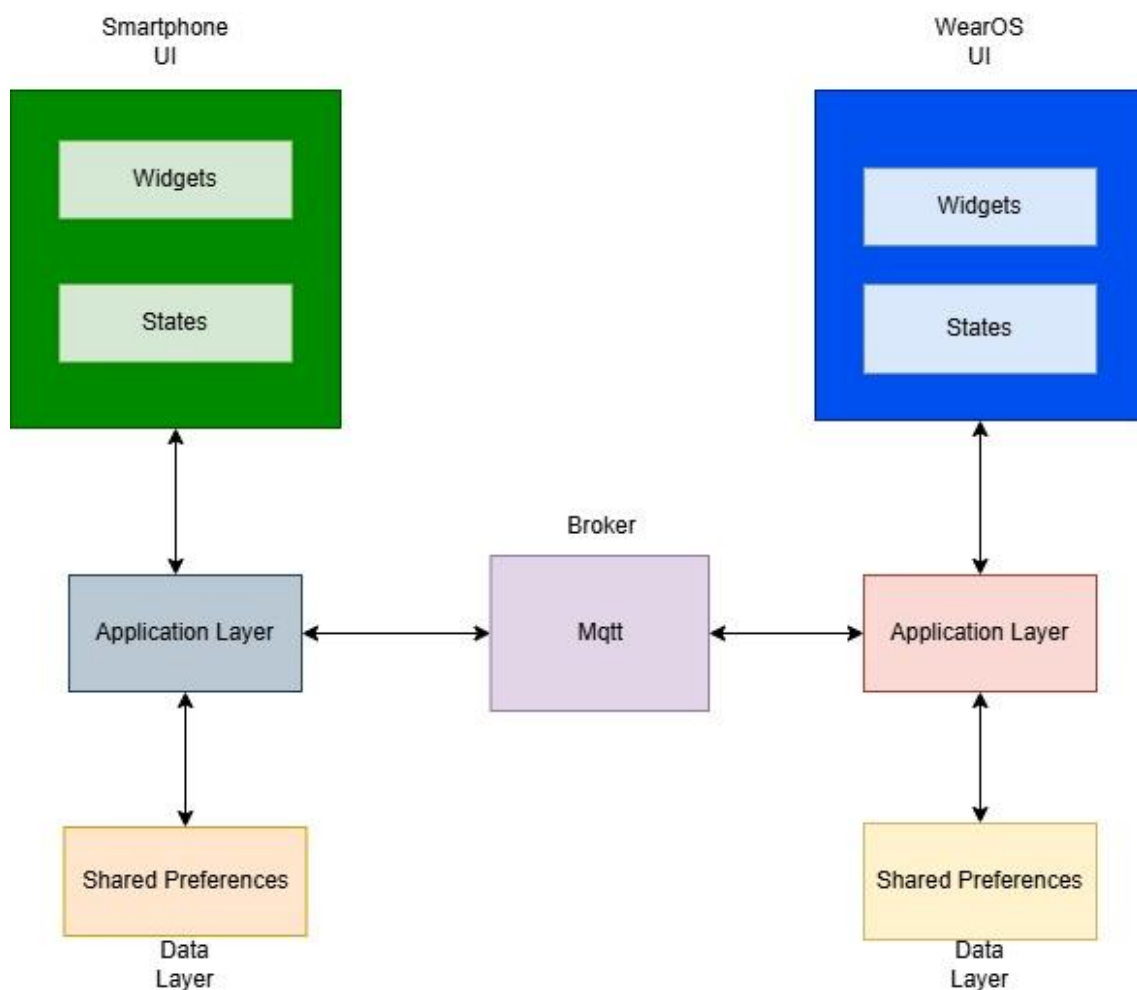
5. Camera for QR Code Scanning:

FitPulse incorporates a camera feature that allows users to scan QR codes to share and compare their fitness metrics easily. This functionality promotes social interaction and friendly competition by enabling users to generate and share QR codes containing their health data.

6. Login with firebase

To make the login we use firebase to easily manage the users that access the application.

5. Architecture



UI

To create the user interface of our applications, we utilized widgets that can exhibit different states throughout the application. This approach allows for a dynamic and responsive user experience, adapting to various user interactions.

Communication

For communication between the smartphone application and the WearOS application, we opted to use MQTT, a lightweight messaging protocol that facilitates efficient information exchange between the two platforms. This choice enables real-time data synchronization.

Data Layer

Both applications utilize local storage mechanisms (SharedPreferences) to store health metrics, and activity logs. This ensures that data is available offline and can be quickly accessed.

6. Assessment

We successfully achieved our development goals, having implemented all the features initially planned for the application.

Issues found

During the development of the application, our primary challenge was establishing reliable communication between the smartphone app and the smartwatch app. We faced difficulties in managing data consistency across both platforms, especially when handling real-time metrics like heart rate and step count. Addressing these issues required extensive testing and adjustments to the communication protocol to improve stability and responsiveness. Despite these challenges, we were able to implement solutions that ultimately allowed the smartphone and smartwatch to communicate effectively.

Contribution Assessment

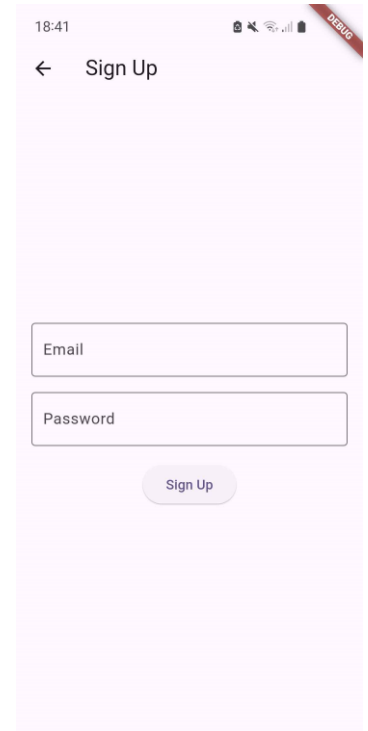
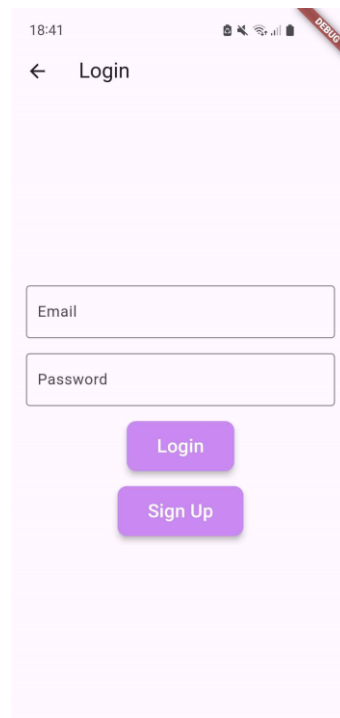
Diogo Silva (50%)

Miguel Cruzeiro (50%)

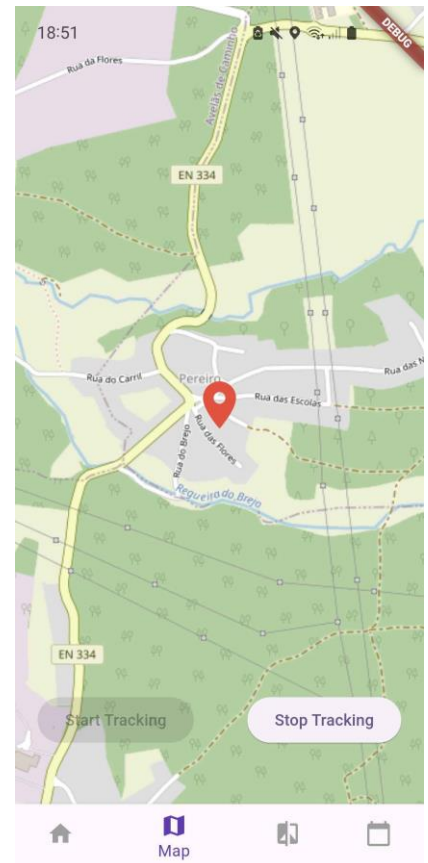
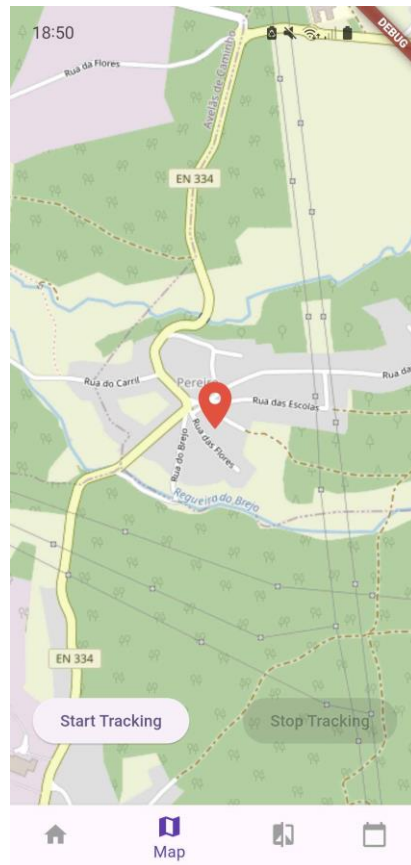
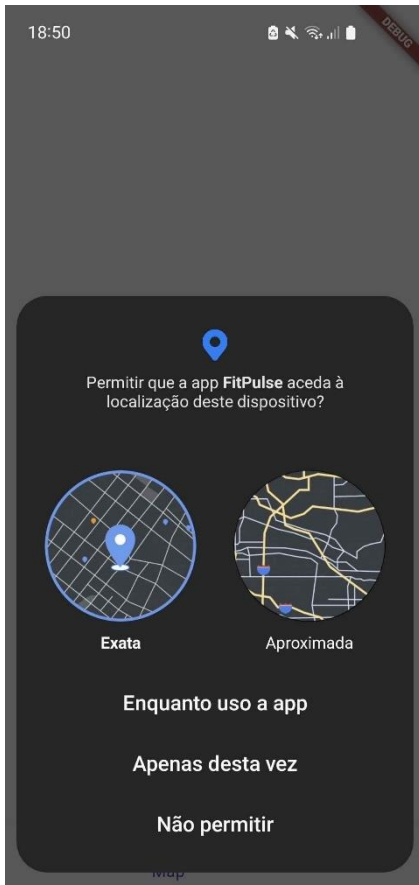
[GITHUB REPO](#)

7. Tutorial

Upon opening the app, the first screen provides two options: create a new account or log in to an existing one.



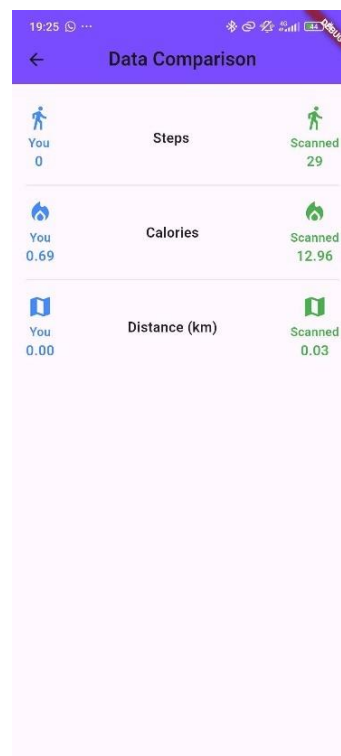
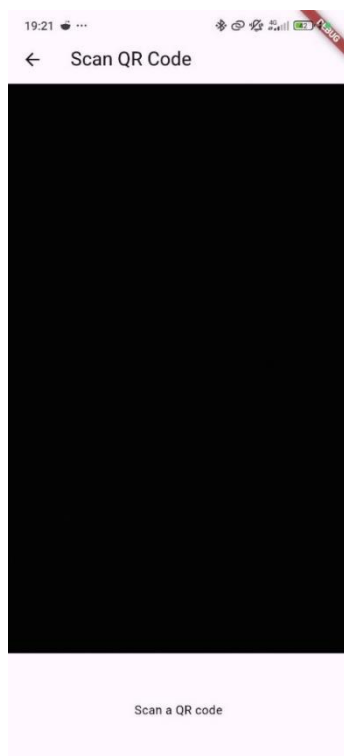
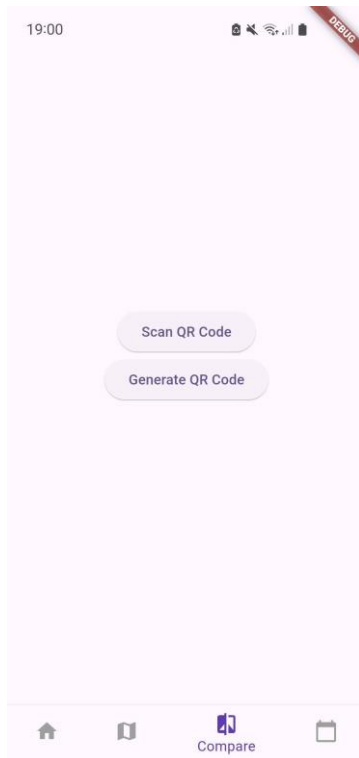
When selecting the map tab, the app will prompt you to enable location services if they aren't already active on your device. Once enabled, the map displays your precise location. By tapping “Start Tracking,” the app begins recording your route in real time, creating a path that tracks your movement. Tap “Stop Tracking” to end the route recording.



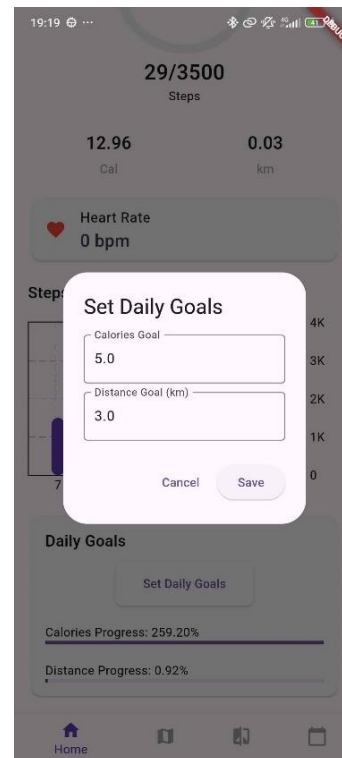
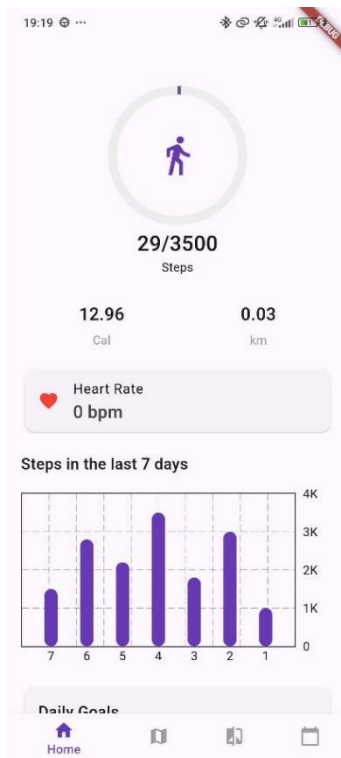
We developed a Wear OS smartwatch app that displays real-time health metrics such as calories burned, steps taken, heart rate, and distance traveled. With permission to access the smartwatch's sensor data, this information is transmitted instantly to the connected smartphone for seamless tracking.



On the compare tab, users can choose to either scan a QR code or generate one. When they select "Generate QR Code," a unique code is created for sharing, allowing others to scan and initiate a comparison. If "Scan QR Code" is selected, users can scan a code from another person to bring up a comparison page, where they can view and compare data seamlessly.



On the home tab, users can view their health metrics, including steps, calories burned, and distance walked, alongside their real-time heart rate measured from the smartwatch. A 7-day chart displays step history, helping users track their weekly activity trends. They can also set daily calorie and distance goals, with visual indicators showing progress toward these targets throughout the day.



The activity history tab provides a detailed view of past health metrics, including steps, calories burned, and distance walked for each previous day, allowing users to track their progress over time and review their daily activity patterns.

