VI Congreso **XoveTIC Talento científico**

Solution for capturing data from wearable devices

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Introduction

Wearable devices have revolutionized healthcare, particularly activity wristbands that seamlessly capture and store health data. However, **accessing this data can be challenging** due to closed, cloud-based storage systems or proprietary data transfer protocols and schemas. In response, we present two methods to automatically extract, process, and store data from fitness trackers in an independent, self-managed database.

Objectives

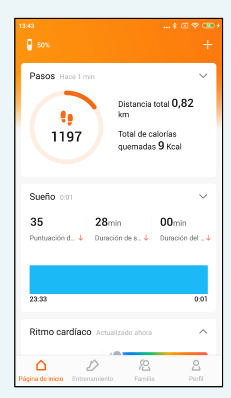
To develop an **automatic system for capturing and managing data from Xiaomi Mi Band** wristbands for its application in research projects.

- Investigate the different forms of access to the data storage location.
- Convert the captured data into usable information.
- Assess the advantages and disadvantages of the analysed systems.

Methodology

Xiaomi Mi Band and ZeppLife

Both methods focus on **Xiaomi Mi Band** devices, which use sensors to track information such as activity intensity, heart rate, sleep, etc. After synchronization with the official **app ZeppLife**, the data is stored in cloud servers and locally on the mobile device, but in a restricted access folder, and could only be accessed with a rooted phone. ZeppLife allows exporting the data, but manually and slowly, and already processed in separate CSV files.

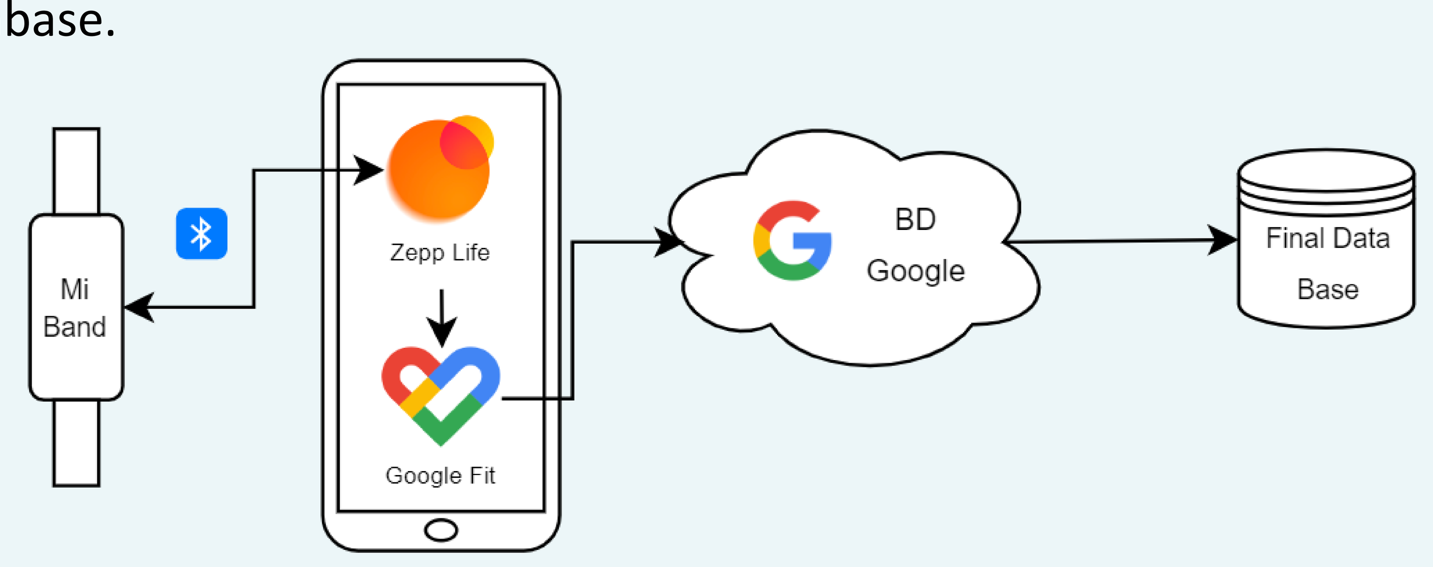


Method 1: through Google Fit

Users **synchronizes Google Fit and ZeppLife** applications, so Google Fit can read the data and manage it independently. It is required **OAuth 2.0**, an authorization protocol that allows apps or websites to access resources on behalf of a user.

The health data recorded by the wristband is accessible through **REST queries** launched against Google's databases.

Data is retrieved in **JSON format**, based on the grouping conditions we specify for then to be processed in our server and stored in our own database.

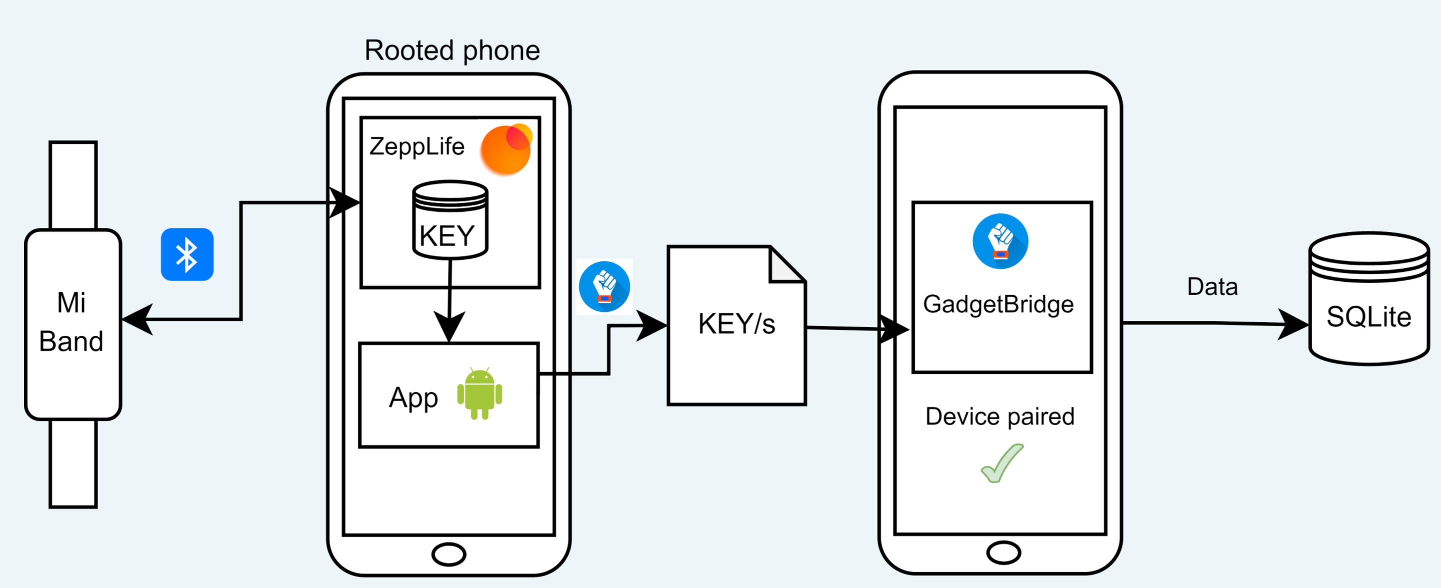


Method 2: through Gadgetbridge

Gadgetbridge is an **open-source Android app** as alternative to ZeppLife. To synchronize, users must obtain the **original pairing key** from the ZeppLife data on a rooted phone and use it in Gadgetbridge. To do this, we developed an application that gets the key with an **SQL query**.

Data is stored in the phone and can be **auto-exported in raw format** to an SQLite database, to an unrestricted directory.

Recordings are every minute, for each connected wristband. Collected sleep data comes **encoded** from the wristband.



Discussion

Each method has a way of operating that can be adapted to **different needs**.

The **Google Fit** method could be targeted at projects looking for broad compatibility, user convenience or scalability, while the **Gadgetbridge** approach for those looking for data privacy and simultaneous management of multiple devices.

	Google Fit	Gadgetbridge
Independence of the Wearable	✓	✗
Independence from External App	✗	✓
Cloud Backup	✓	✗
Account Registration Required	✓	✗
Open Source	✗	✓
No Third-party Data Readings	✗	✓

Conclusions

We consider that the benefits outweigh the limitations. Both methodologies can be potentially **highly beneficial as data capture systems** for wearable devices in research.

Each method can be **targeted at different types of projects** due to their particularities.

In the future, we intend to explore these systems more deeply, focusing on **addressing identified limitations, improving automation, and optimizing** their usage for specific research needs.

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