

Projeto Eletrocap 2023/2024



Smart
Gym
Equipment
Conversion
Kit



SGECK

Meet the Team!



Eduardo Silvestre ist1103478
Team Manager/ Full-Stack Engineer



Eduardo Casanova ist1103611 Hardware Engineer



Duarte Pereira ist1103481
Front-end Engineer



Tomás Ferreira ist1103477
Product Engineer



Duarte Faria ist1103481
Content Manager



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Full-Stack Engineer

Problem Definition

Automated & personalized gym progress tracking is not available for your everyday gym machine.

Price for current technological tracking methods are too high for the average person.

There is no way for a traditional gym to avoid replacing equipment to get equivalent benefits.





Solution requirements

- Simple app with easy tracking of progression.
- Diverse compatibility.
- Efficient power source.
- Accurate data collection.

Technological solution

Add-on device for gym machines with integrated mobile app

- Easy setup and installation
- Essential information tracking (weight, movement profile, rep count)
- In cloud data storage



Connect



Store
Display

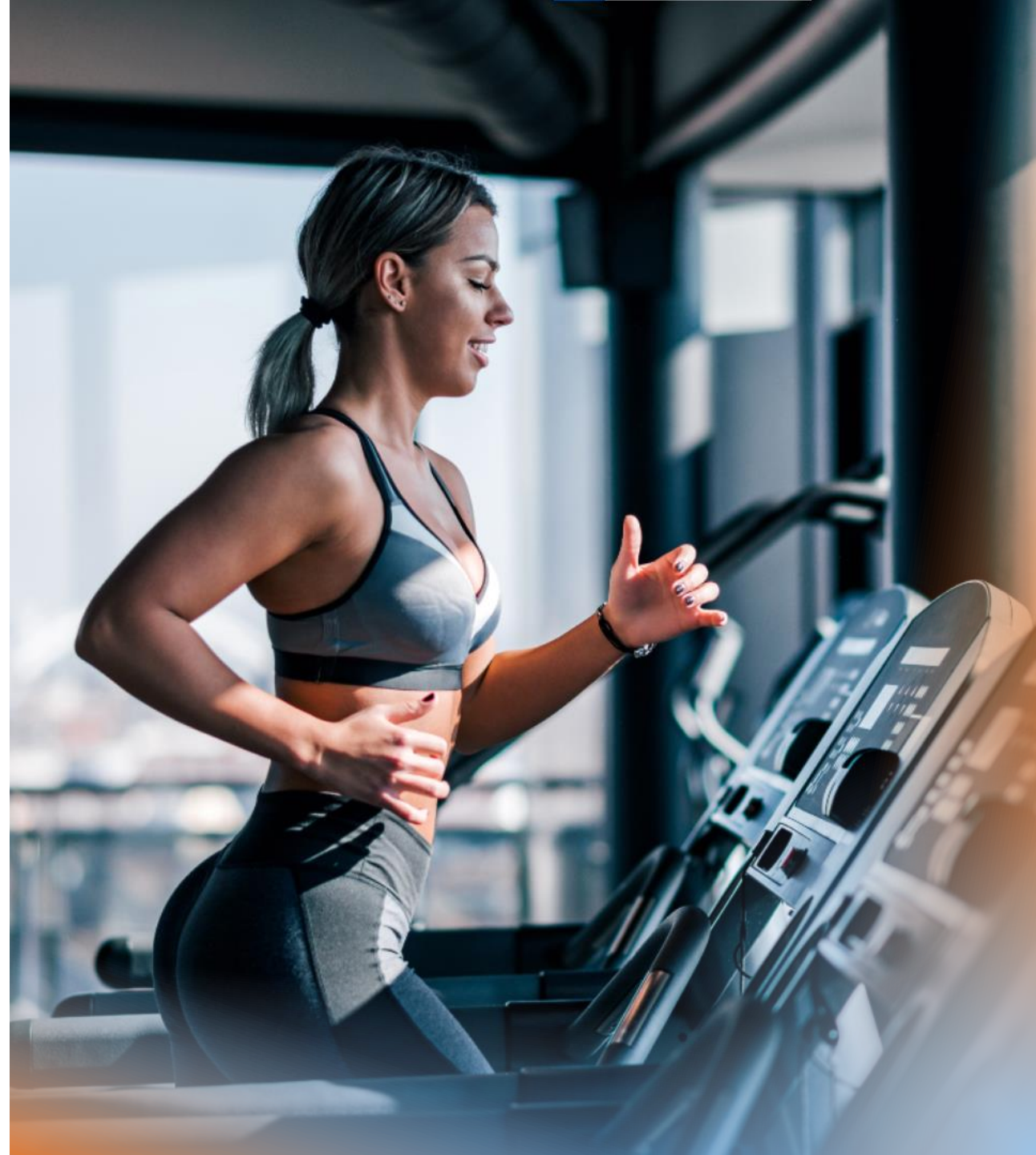


Google Cloud

Solution beneficiaries

Affordable smart gym machines with tracking capabilities would benefit:

- People who exercise
- Fitness Establishments



COMPETITORS



Affordability



Portability



Personalized Feedback



Feedback on exercise quality



Visual indicator of you progress





Partners



- Requirement for space where we can collect reliable data.
- Collaboration with Personal Trainers to set benchmarks for determining exercise quality.

Testing and validation metrics

- Google Forms
- Personal Interviews

We used this to create a better user-centric solution and adapt to diverse demands.



Participant Profile (Google Forms)

So far 61 submissions have been acquired.

Age range – Roughly 67% of user feedback came from the 18-24 age group.

Contact with Fitness – Around 69% of participants mentioned being or having been in a gym setting.

Experience – From those that had contact, 57% had only up to 2 years of experience.

Tracking– About half of the participants currently don't track any aspect of their workouts.





User Feedback (Google Forms)

The most requested features based on feedback:

- Counting Repetitions/
Keeping track of Sets
- Measuring Exercise Quality
- Training Customization
- Notifications for progressive overloading

Key Insights and Opportunities

- Most users will be young and somewhat inexperienced
- Diverse objectives imply a need for adaptation of training and tracking
- Based on the amount of people who don't track their progress, SGECK has a market to grow on
- Features to focus on:
 - Rep count
 - Movement quality assessment



Achieved results

Interviews
& Surveys



Google Forms



Personal Interviews

Studied
Tools



Android Studio



Kotlin



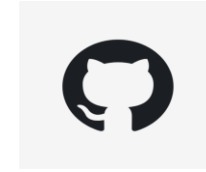
Firebase



Hugo



Arduino



GitHub

Competitor's
Analysis

Check out our website for more information!

Mobile App

Implemented on a **real** mobile device

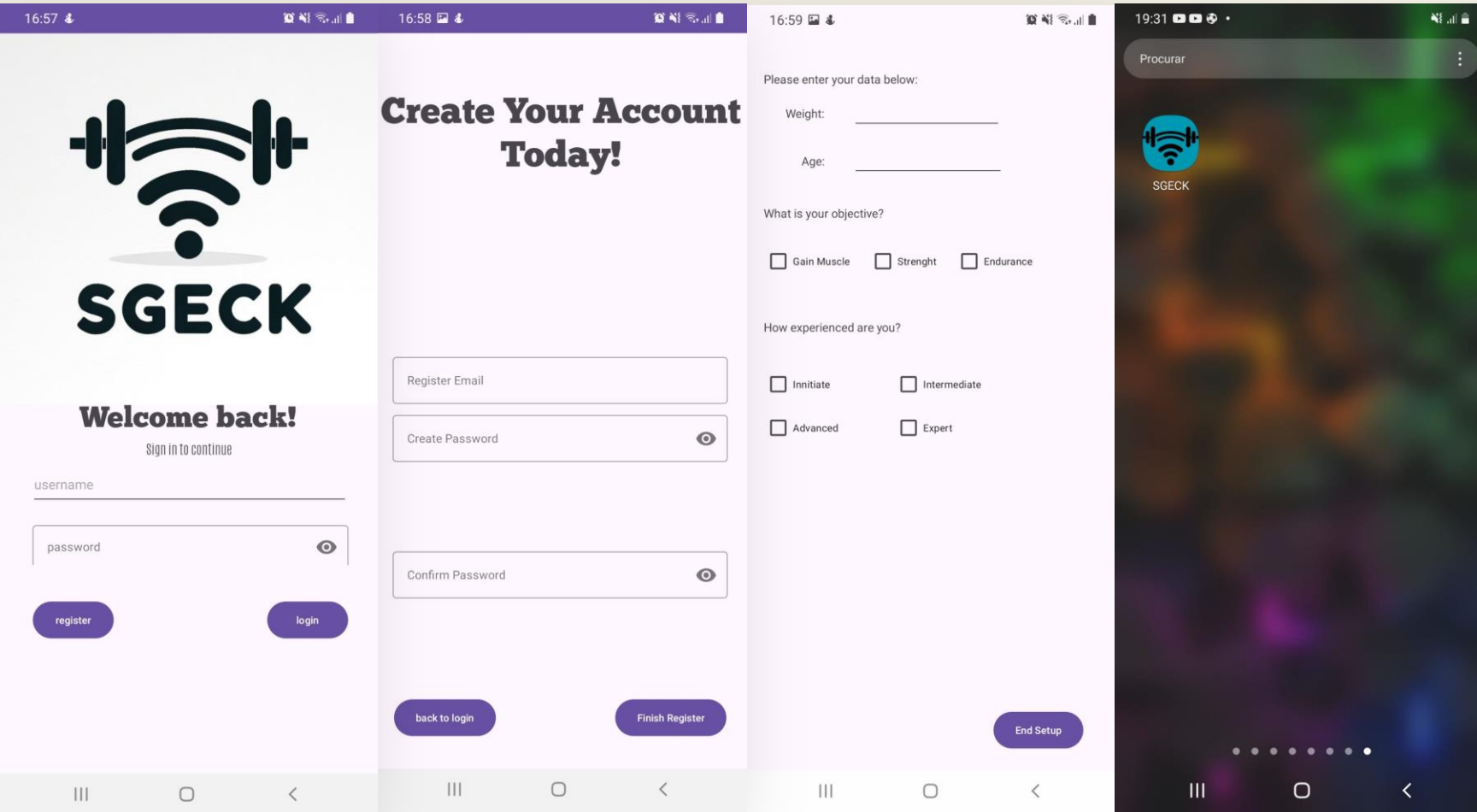
Achieved results



Mobile App implementations:

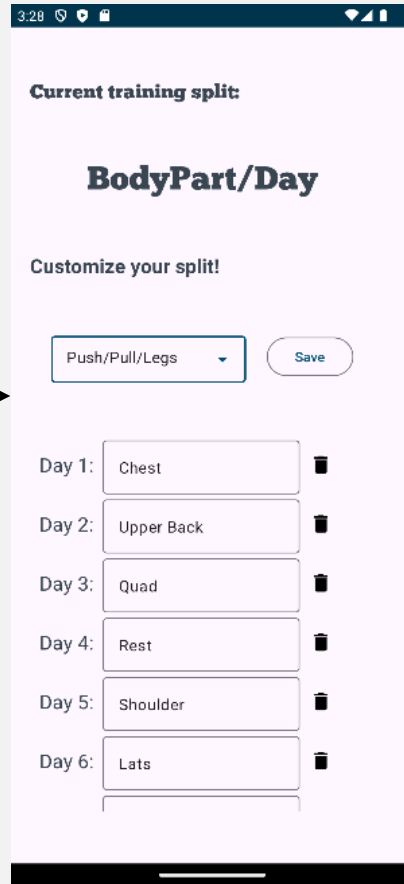
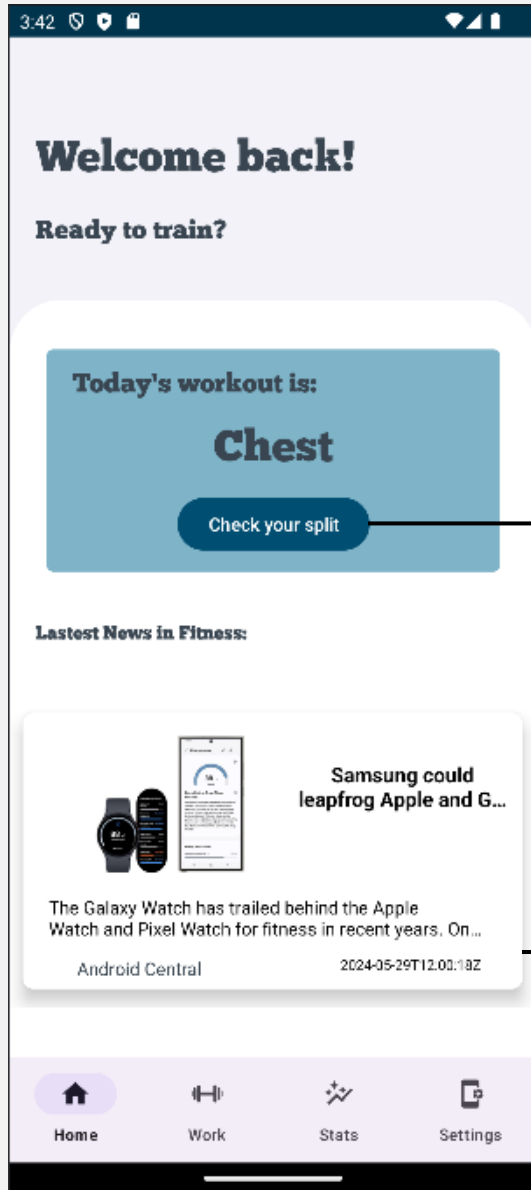
- User authentication incorporated in Firebase
- Workouts page - Combination of pre-existing exercises with customizability
- Database structure development for better data organization and updating UI during app usage.
- BLE data reception structure for processing
- Data filtering and normalizing
- Calculating average repetition with a benchmark exercise recorded from personal trainers
- Comparing average rep with our benchmark to determine a grade for your performance

App Showcase

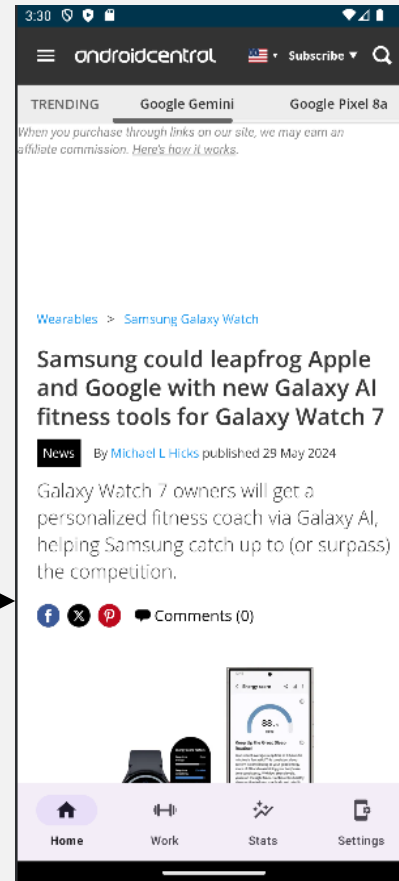


- Login page with Logo
- Registration Page
- User Setup when registering an account (or altered in Settings)
- Functional App on real mobile device

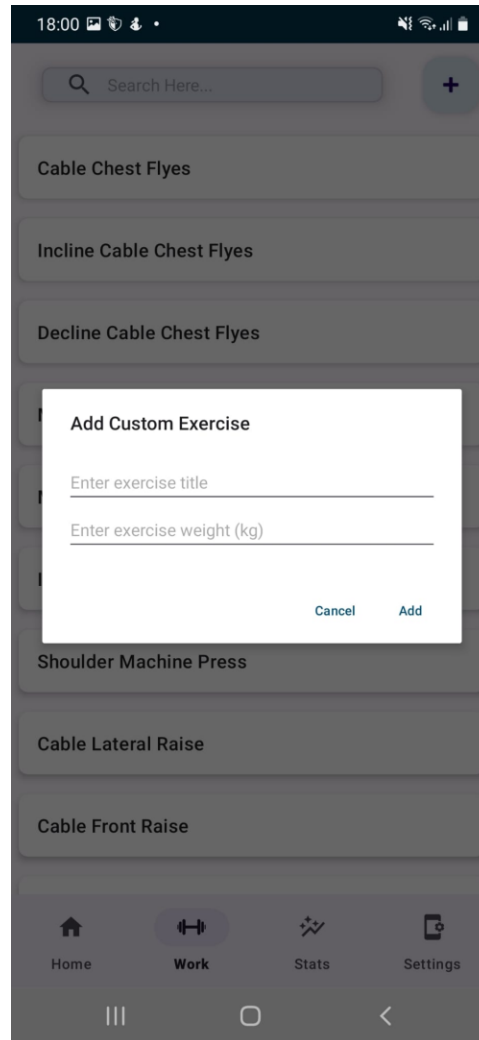
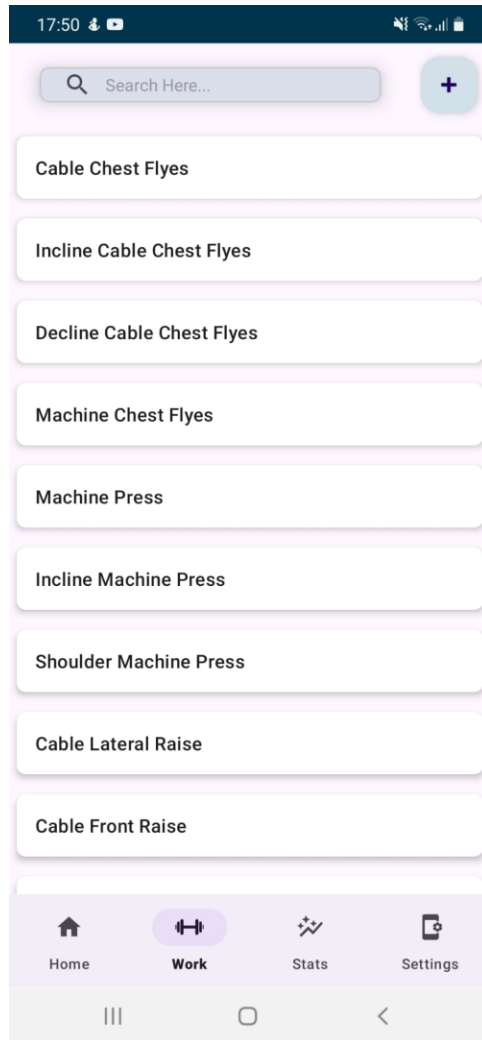
App Showcase (Home Screen)



Training Split Page:
Costumizable Training Split



News API:
Read Fitness related articles

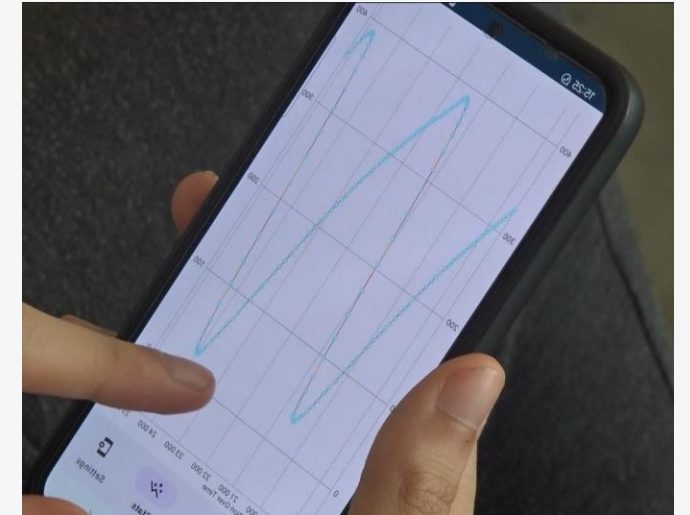
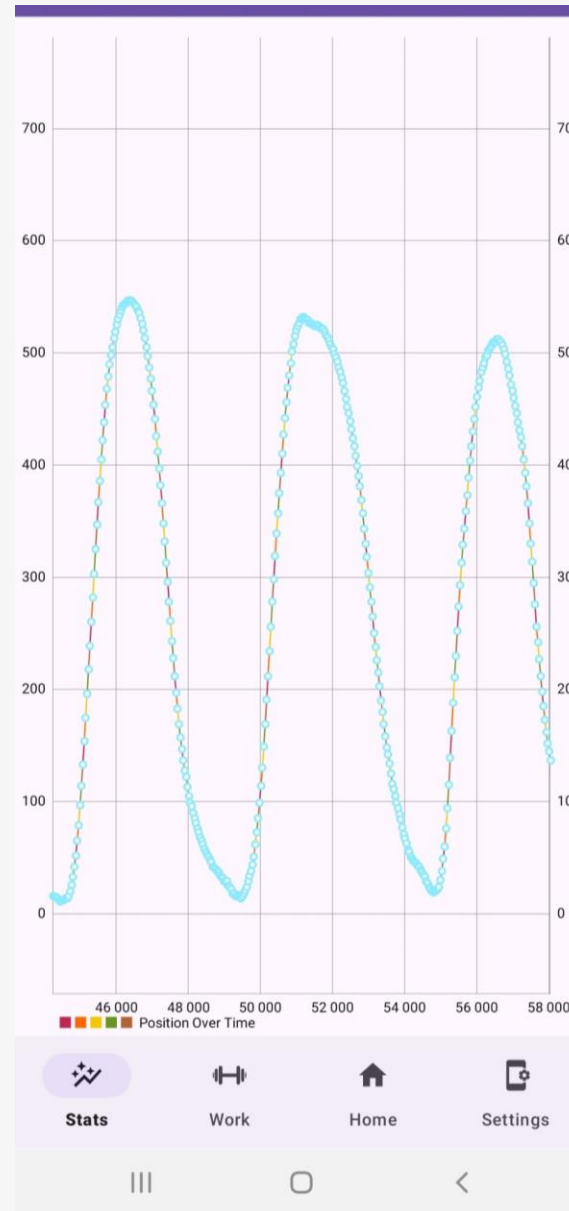


App Showcase (Workouts Page)

- Select your exercise or add a custom exercise
- Connect to the SGECK device
- And you are all set to start exercising!

App Showcase (Stats Page)

- Analyze the results of your training in the stats page!
- Visualize your movement
- Check your performance grade
- Performance is determined as a percentage from a reference
- Reference exercises are collected from professionals



Backend (App)



The screenshot shows the Firebase console interface for a project named "FitnessApp". The breadcrumb navigation is "FitnessApp > Users". The main content area is divided into three columns representing the database structure:

- Column 1 (Users):** Shows a collection named "Users" with three documents: "1UqI1Lgθxcag5vKtLNQ8yz4v3jo1", "2Ais5VPmP2UkP7kURFnYz4adiPC2", and "59rBxNKui5XcIze71YpM70RA6th1".
- Column 2 (gl2m4jTzdfWow... > Split):** Shows a collection named "Split" with three documents: "cbsaZMwhhtWNyJ9pmCEYxg2HeHD3", "f8abwvSHyNV2Demj8TwaHcLktmZ2", and "g12m4jTzdfWowEzyU7tJG1anVY83".
- Column 3 (Split):** Shows a collection named "Split" with three documents: "Day1: 'Chest'", "Day2: 'Legs'", and "Day3: 'Arms'".

At the bottom, there is a section for "Split" with a document "Split: 'BodyPart/Day'".

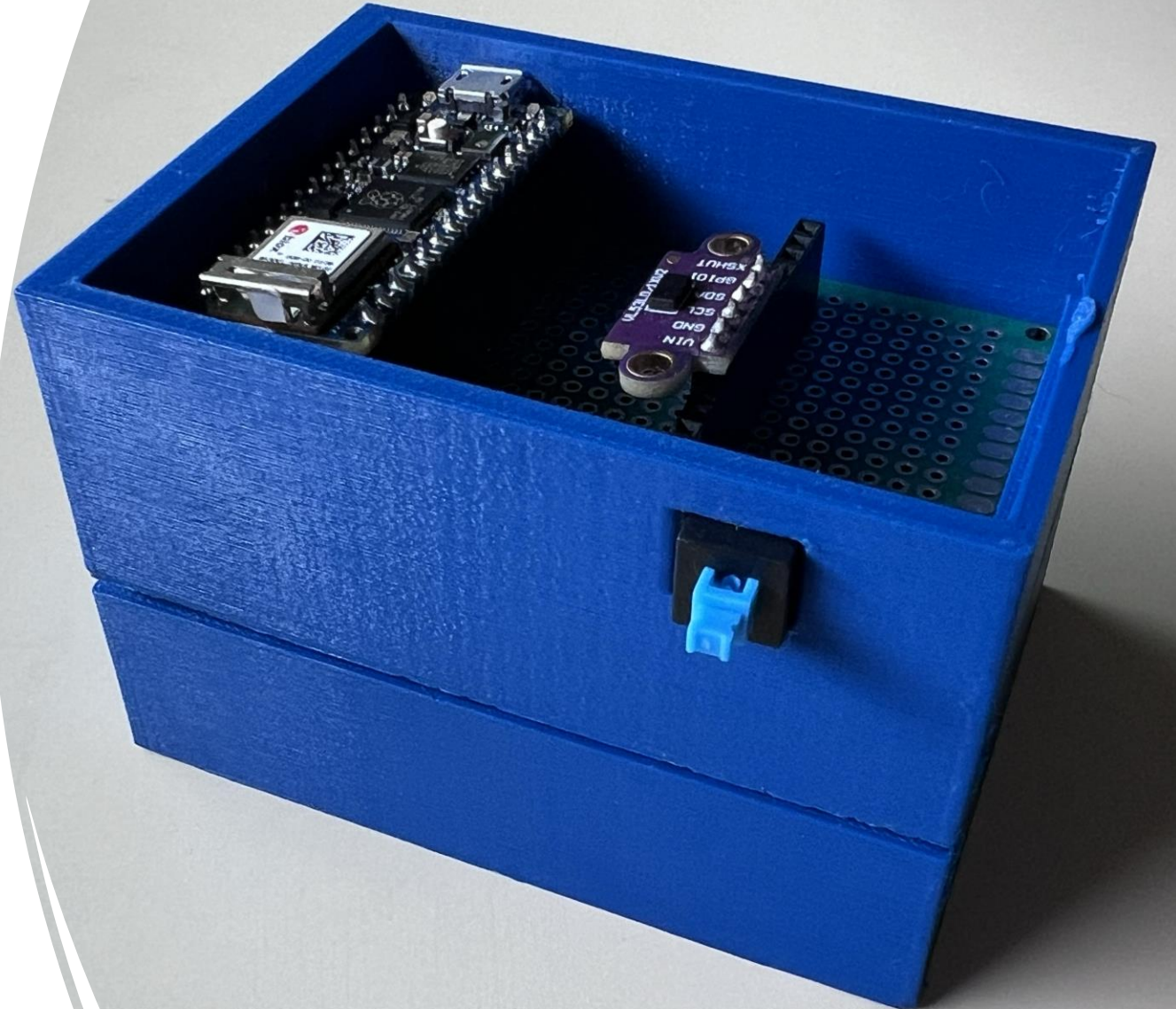
Stores:

- User's Information
- Training Plan
- Default and Custom Exercises
 - Instances
 - Weight
 - Reps
 - Quality

Achieved Results - Hardware

Arduino implementations:

- Accelerometer and ToF sensor data collection
- Bluetooth LE advertising and connection to cellphone
- Disconnect handling
- Finished Prototype



Contribution of each team member

Eduardo Silvestre	Eduardo Casanova	Duarte Pereira
Firestore connectivity/ Database Integration	Data transmission	News API
Data Processing/Visualization	Digital Data Filtering	Google Forms
BLE Data Receival on App	Hardware Assembly	Personal Interviews

Contribution of each team member

Duarte Faria	Tomás Ferreira	Jorge Contente
Promotional Video	Arduino casing	Figma/Material Design
Blogpost writing	Prototype Design	Backend management
Webpage creation	Market Studies	User Interface

For more information on SGECK check out:

- Our website: <https://web.tecnico.ulisboa.pt/ist1103611/SGECK/>
- Our blog: <https://web.tecnico.ulisboa.pt/ist1103611/SGECK/blog/>
- Our demonstration video: <https://www.youtube.com/watch?v=CssjTli1sJQ>