

ElectroCap

Smart Home Stock

Pitch Deck



TÉCNICO LISBOA

Team members

SMART HOME STOCK



Ricardo Fiúza (Leader)

Hardware Engineer



Rafaela Pereira (Co-leader)

Communication App-Prototype



Renato Simões

Prototype Designer



Vera Amaral

Website Designer and Manager



Henrique Simões

Software Engineer



Leonor Mira

Image/Video Designer

Advisors and mentor

SMART HOME STOCK



António Grilo
Scientific advisor



Teresa Vazão
Coordinator



Ricardo Santos
Mentor



Problem definition

Problem definition

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What kind of items (and their respective quantity) do I have inside my home?

Unnecessary purchases

Items running out unexpectedly

Unnecessary food waste



A hand holding a black marker is shown writing the words "win win" in a cursive script on a whiteboard. The whiteboard is part of a circular inset against a dark teal background. The words are stacked vertically, with "win" on top and "win" below it. The background of the whiteboard shows faint silhouettes of people.

win
win

**Solution
beneficiaries**

Solution beneficiaries

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Household Member

Improved organization
and awareness of
available food supplies.



Shopper for Dependent

Streamlined shopping
experience with an automated,
more accurate and personalized
shopping list.



Environment

Reduction in food
waste contributes
to environmental sustainability.

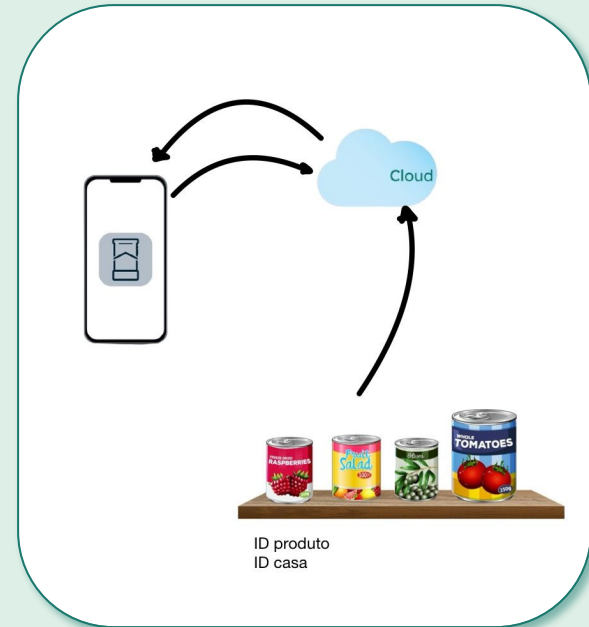


**Technological
solution**

Technological solution

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- **Hardware:** determines which products and respective quantities are in stock.
- **Cloud Server (Database):** Receives and stores data of every product.
- **Mobile App:** user's interface.





Solution requirements

Solution requirements

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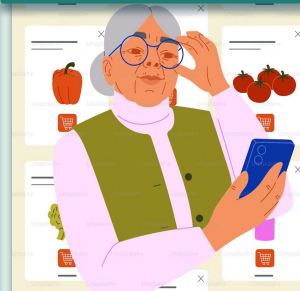
Camera to accurately monitor stored items



Weight sensors for item quantity determination



Mobile app is essential to know products data



Custom-made pantry shelves to accommodate every home



Solution requirements (Mobile App)

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Stocked Items

Displays every single stocked item and their respective quantities.



Low Item Quantities

Warns the user's when a determined product is low on quantity.



Shopping List






Automatically generates a shopping list based on products' quantities. User should be able freely add items.

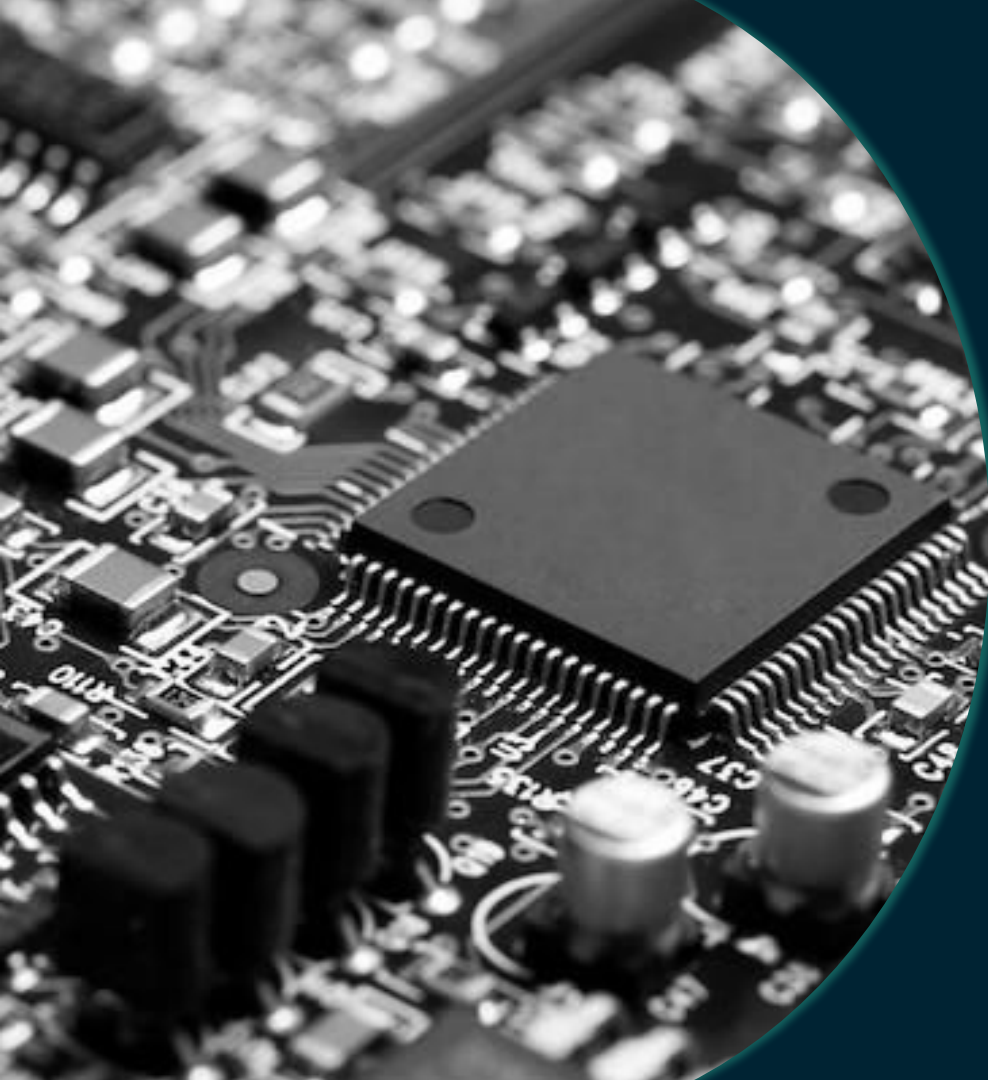


Competitors & previous work

Competitors & previous work

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| |  |   |   |
|---------------|---|--|--|
| Technology | Shopping list app | Smart shelves connected to mobile app. Automatic shopping list. | Smart Fridge |
| Advantages | Not dependent on working hardware | Precise product data | More features (ex. voice control) |
| Disadvantages | Not made automatically | Manual predefined product location, less intuitive & poor product stacking. | Costlier & only applies to fridges |



Technical challenges

Technical challenges

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Weight sensors
accurately measuring
items quantities

Visual confirmation of
working hardware

Camera identifying
products correctly

Safeguard user
stored data

Reliable
communication with
database

Create intuitive and
user-friendly
application



Testing and validation metrics

Testing and validation metrics

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To test and validate our idea, we decided to create a [formulary](#).

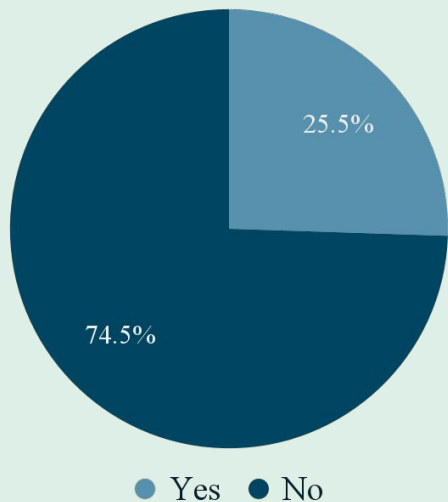
- More than 400 responses.
- Confirmation of problem existence in people's daily life.
- Obtained some ideas from responses that we could implement into our system to better improve its usefulness to the user.

Testing and validation metrics

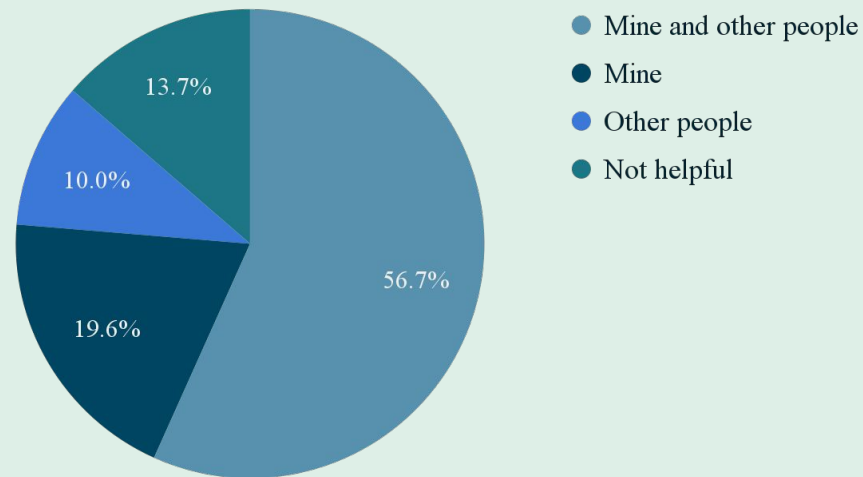
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Data Analytics | N° of answers: 439

Responsibility for someone older or dependent



Usefulness of using an automated system at home

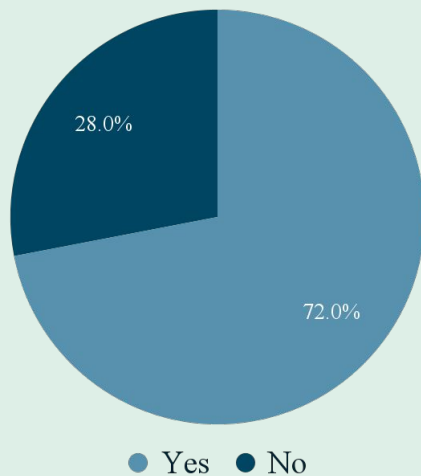


Testing and validation metrics

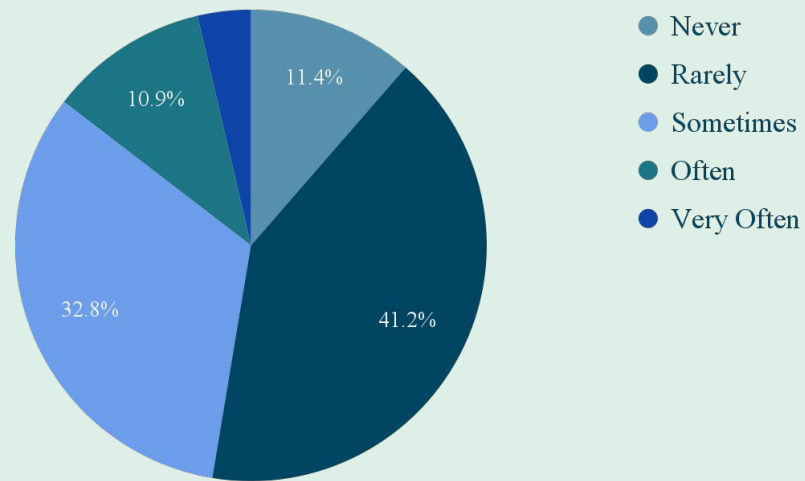
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Data Analytics | N° of answers: 439

Do you have the habit of making a shopping list?



How often do you forget what you need to buy while





Division of labor & team

Division of labor & team

SMART HOME STOCK - Prototype team

| Ricardo Fiúza | Rafaela Pereira | Renato Simões |
|--|---|---|
| Search for Partners (Responsible) | Wireless communication between ESP32 CAM and Firebase (Responsible) | Object Identification with ESP32 - CAM & OV2640 (Responsible) |
| Hardware Development and Management (Responsible) | Object Identification with ESP32 CAM | Wireless communication between ESP32 CAM and Firebase |
| Prototype Modelling | Prototype Modelling | Prototype Modelling (Responsible) |

Division of labor & team

SMART HOME STOCK - Software & design team

| Vera Amaral | Henrique Simões | Leonor Mira |
|---------------------------------|---|----------------------------|
| Update Management (Responsible) | App Development and Management (Responsible) | Image Design (Responsible) |
| App Design | App communication with Firebase (Responsible) | App Design |
| App Development | Update Management | App Development |



**Original
schedule**

Original schedule (Based of original idea)

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| Tasks | November | December | January | February | March | April | May | June |
|--|----------|----------|---------|----------|-------|-------|-----|------|
| Learn Web Development | | █ | | | | | | |
| Learn Kotlin and Swift | | █ | █ | | | | | |
| Prototype Modelling | | █ | | | | | | |
| Search for Partners | | █ | █ | █ | █ | █ | | |
| Image Design | | █ | █ | █ | █ | █ | █ | |
| Figma | | █ | | | | | | |
| Web Development and Managment | | █ | █ | █ | █ | █ | █ | |
| Hardware and Software Development | | | █ | █ | █ | █ | █ | |
| Wireless Communication | | | █ | █ | █ | █ | █ | |
| Testing Project | | | █ | █ | █ | █ | █ | |
| App Development | | | | █ | █ | █ | █ | |
| Final Modelling of Various Types of Containers | | | | | | █ | █ | |

Mid-program status

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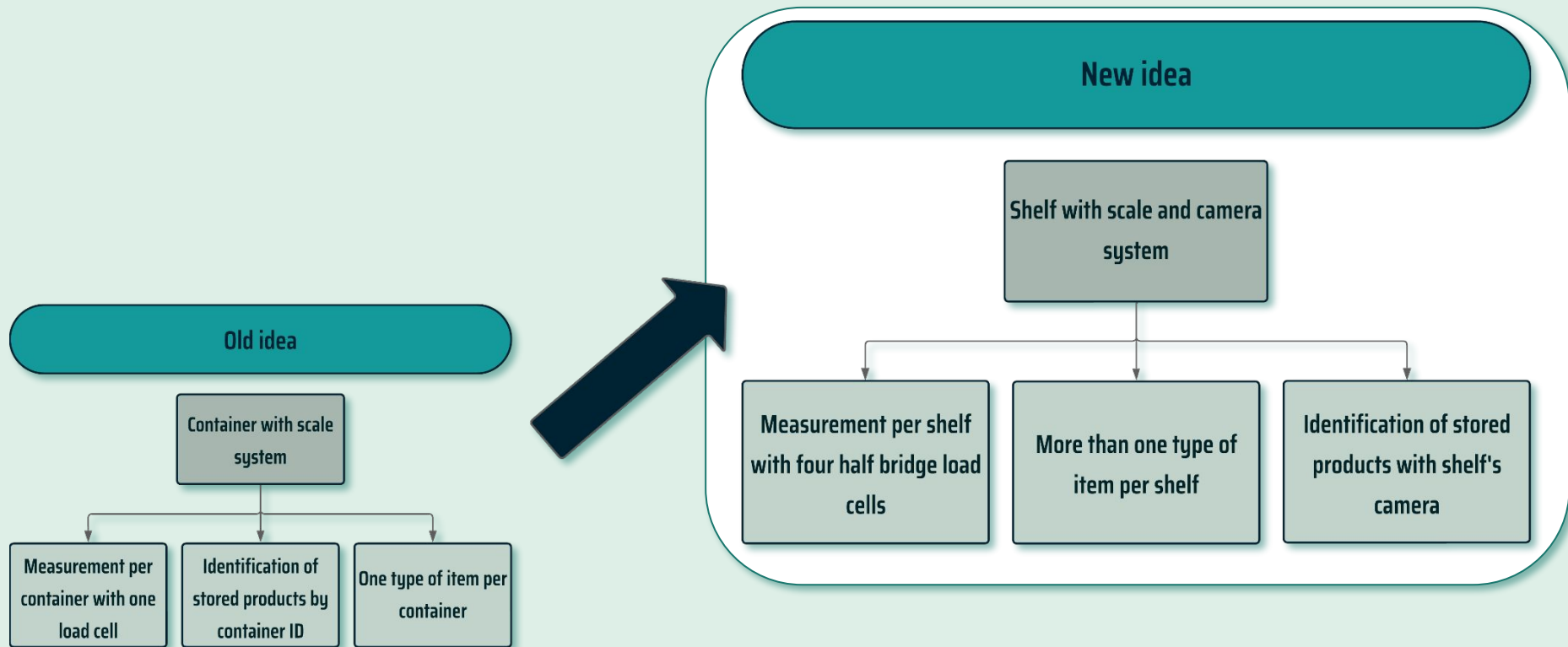
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**Achieved
results**

Achieved results (Mid-program)

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Achieved results (Mid-program)

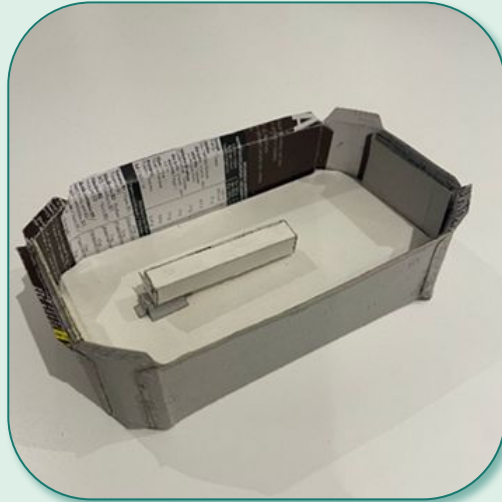
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Old idea

- Prototype



Container design



Interior of the base



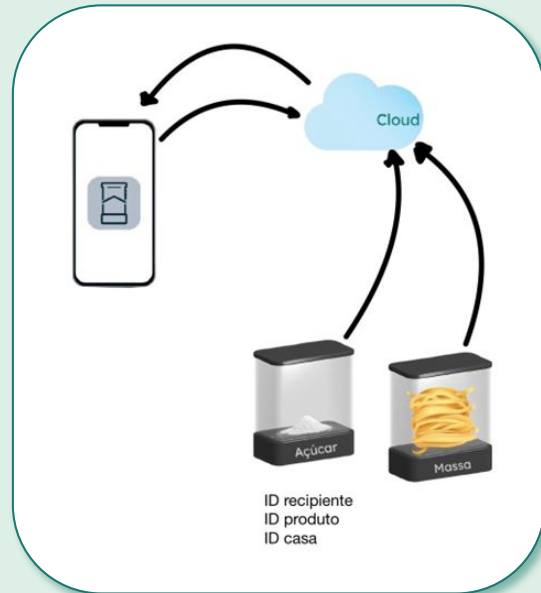
Base with lid

Achieved results (Mid-program)

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Old idea

- System



- Technology

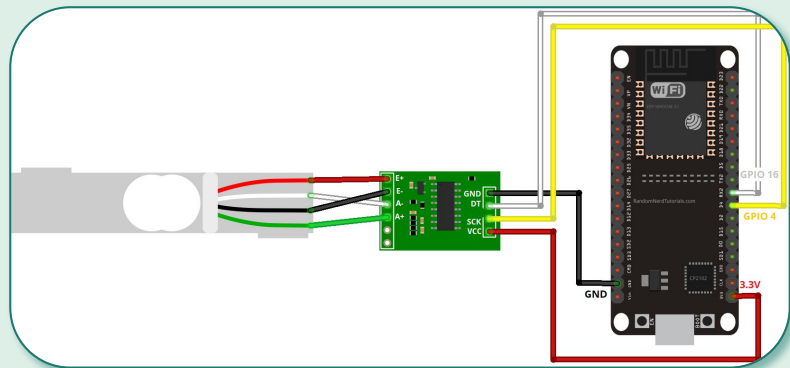
- ESP32
- HX711
- Load Cell
- Recipient
- Firebase
- Mobile app

Achieved results (Mid-program)

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Old idea

- Layout



- Hardware

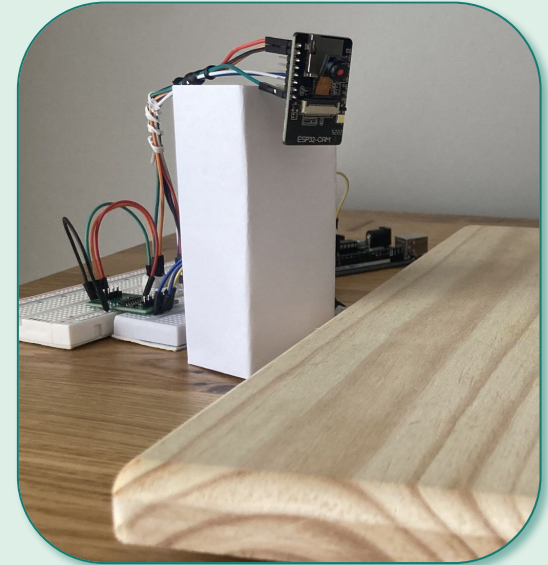
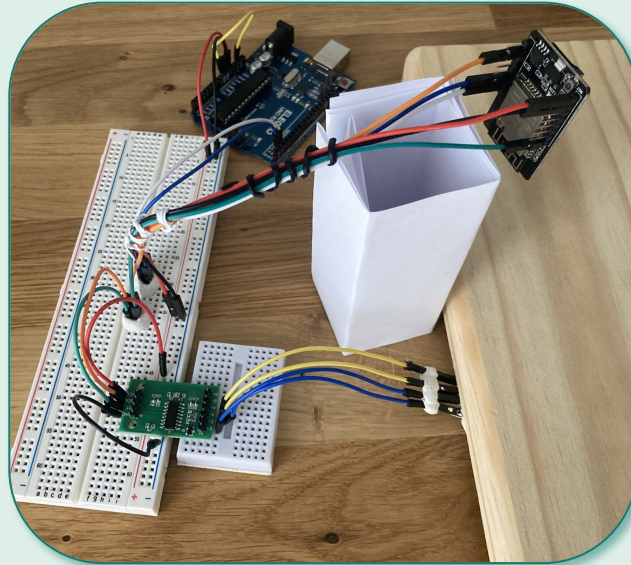
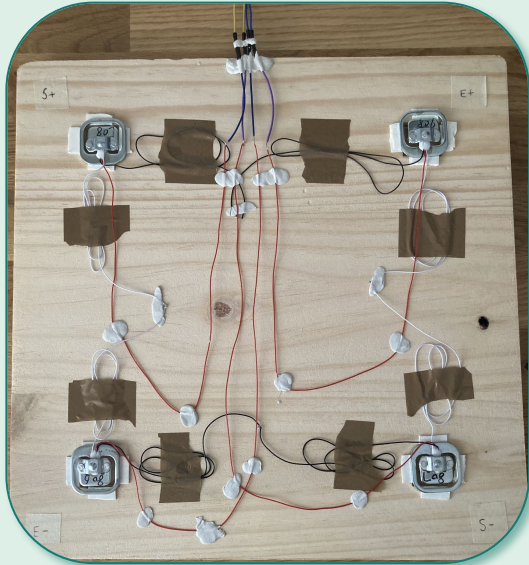
- ESP32 Wroom NodeMcu Wifi CP2102
- HX711 (24-Bit ADC)
- Load Cell (Weight sensor 10 kg)

Achieved results (Mid-program)

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New idea

- Prototype

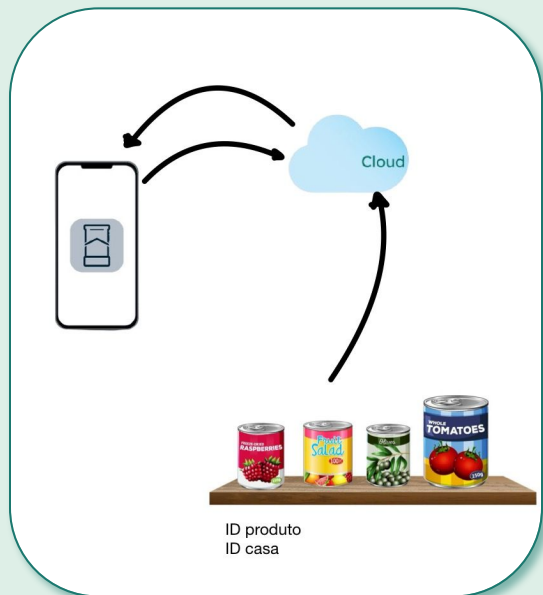


Achieved results (Mid-program)

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New idea

- System



- Technology

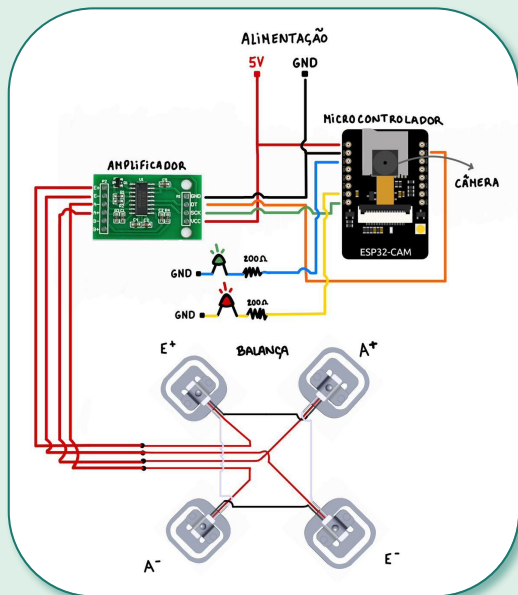
- ESP32
- OV2640
- HX711
- Half Bridge Load Cell (50 kg)
- LED
- Resistor
- Wooden board
- Firebase
- Mobile app

Achieved results (Mid-program)

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New idea

- Layout



- Hardware

- ESP32 - Cam (Microcontroller)
- OV2640 (Camera)
- HX711 (24-Bit ADC)
- 4x Half Bridge Load Cell (Weight sensor 50 kg)
- Green LED (Camera indicator)
- Red LED (Scale indicator)
- 2x Resistor (200 Ω)

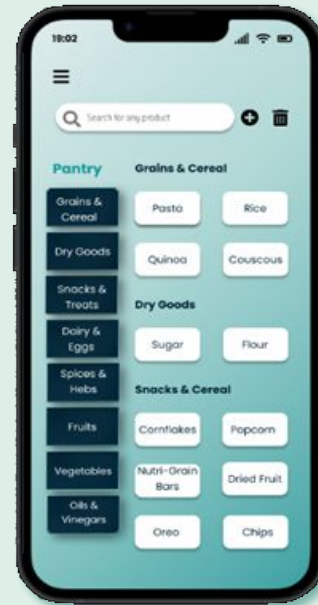
Achieved results (Mid-program)

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Mobile application

- Figma (app design)



Achieved results (Mid-program)

SMART HOME STOCK



Mobile application

- Figma (app design)





Members contribution

Members contribution (Mid-program)

SMART HOME STOCK - Prototype team

| Ricardo Fiúza | Rafaela Pereira | Renato Simões |
|------------------------|------------------------|------------------------|
| Prototype Modeling | Prototype Modeling | Prototype Modeling |
| Hardware Block Diagram | Hardware Block Diagram | Hardware Block Diagram |
| Hardware Projection | Hardware Projection | Hardware Projection |

Members contribution (Mid-program)

SMART HOME STOCK - Software & design team

| Vera Amaral | Henrique Simões | Leonor Mira |
|--------------------------------|--------------------------------|--------------------------------|
| Web Development and Management | Web Development and Management | Web Development and Management |
| Figma Application Design | Figma Application Design | Figma Application Design |
| Figma Website Design | Figma Website Design | Figma Website Design |



Challenges faced

Challenges faced (Mid-program) - Idea change

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Why did Smart Home Stock team changed their approach?

| | First Idea | Second Idea |
|---------------|---|--|
| Advantages | Easier product identification and quantity tracking Simpler implementation of automation | Cheaper Less hardware Integrated pantry shelf technology |
| Disadvantages | Too costly for general use Requires more space for technology | More challenging product identification and quantity tracking Harder implementation of automated system |

Challenges faced (Mid-program)

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Other challenges faced

- How other programs/technology work. (ex: HTML & CSS)
- Calibration of half bridge load cells.





Schedule deviations

Schedule deviations (Mid-program) - Causes

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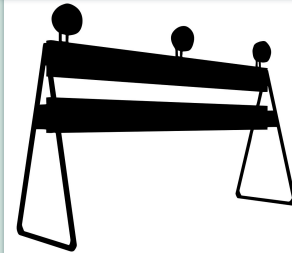
Unclear
project scope
and objectives



Underestima-t
ing task
complexity



Technical
hurdles and
unforeseen
issues



Limited access
to equipment,
software and
expertise



Personal
commitments
and workload





**Corrected
schedule**

Final results

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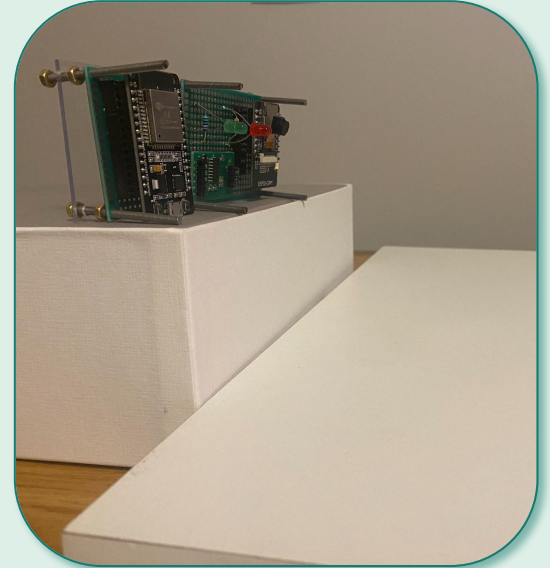
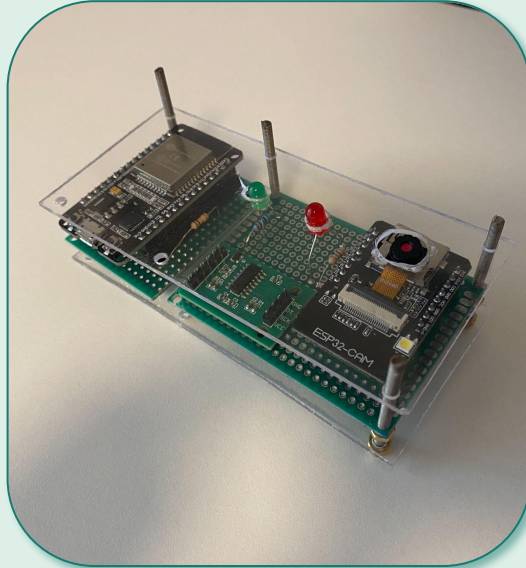
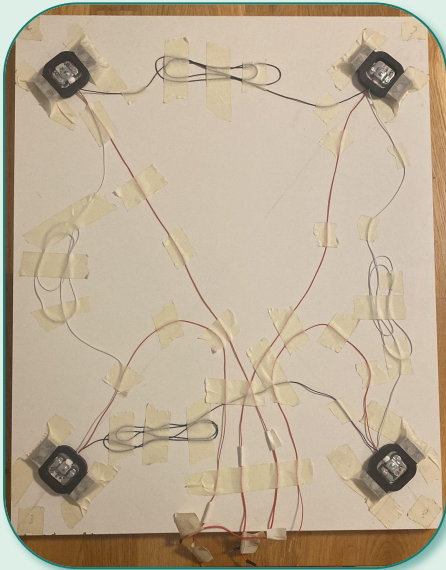


**Final project
results**

Final project results - Prototype

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- New and improved wooden board
- Extra ESP32 (One for the camera and one for the scale)

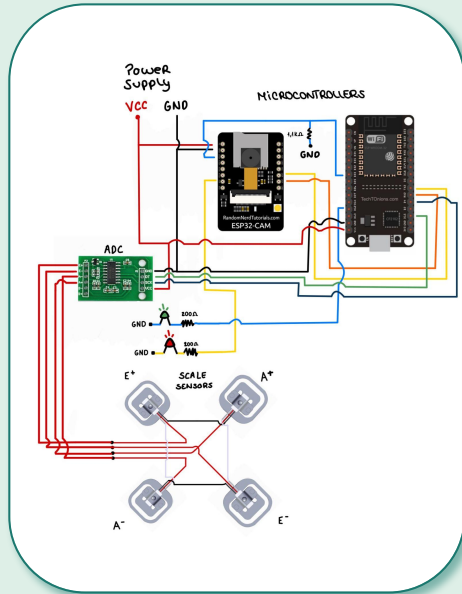


Final project results - Prototype

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Final idea

- Layout

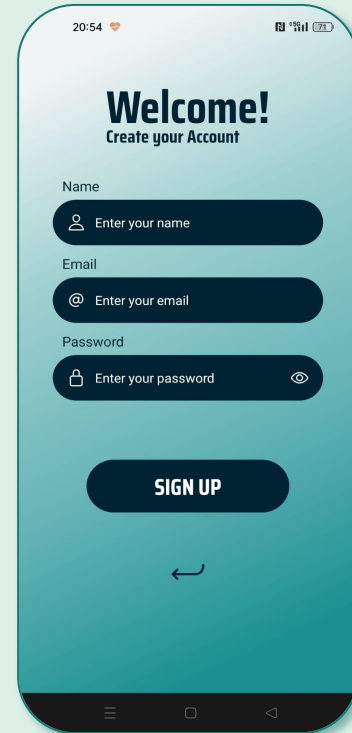
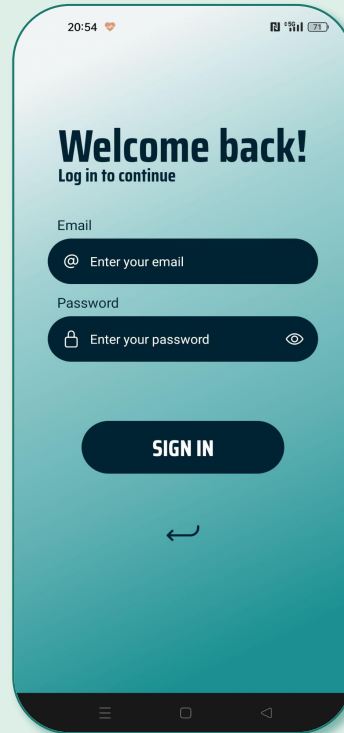
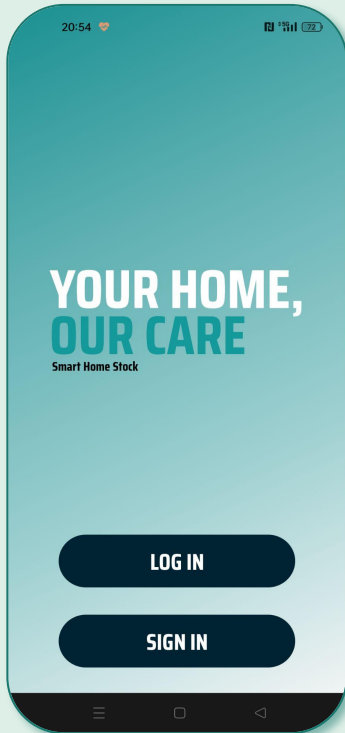


- Hardware

- ESP32 - Cam
- ESP32 Wroom NodeMcu Wifi CP2102
- OV2640 (Camera)
- HX711 (24-Bit ADC)
- 4x Half Bridge Load Cell (Weight sensor 50 kg)
- Green LED (Camera indicator)
- Red LED (Scale indicator)
- 2x Resistor (200 Ω)

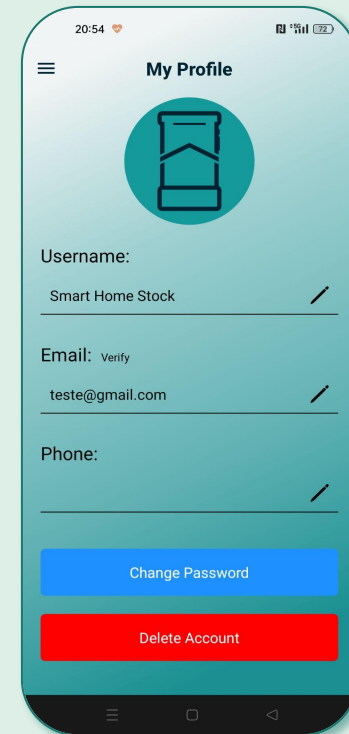
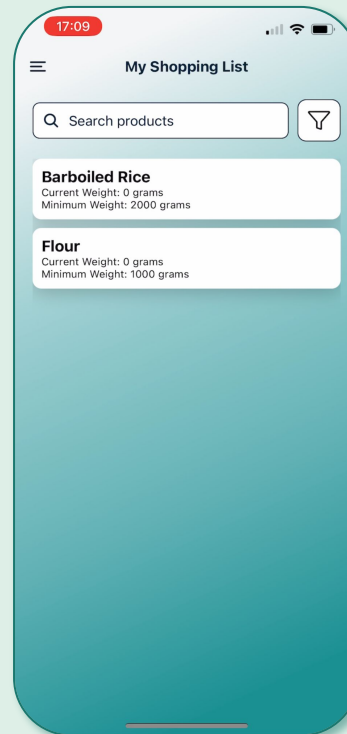
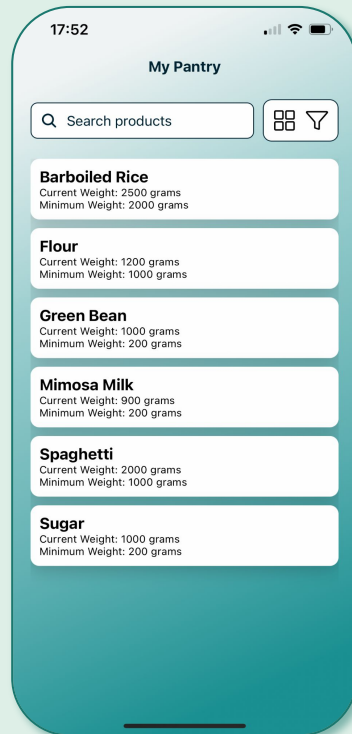
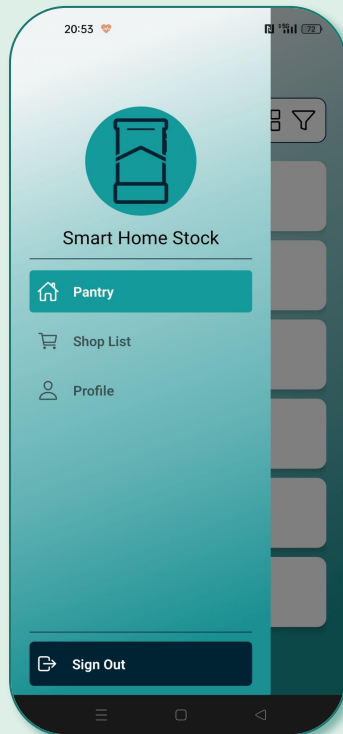
Final project results - Mobile App

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Final project results - Mobile App

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Members final contributions

Members final contributions

SMART HOME STOCK - Prototype team

| Ricardo Fiúza | Rafaela Pereira | Renato Simões |
|----------------------|------------------------|----------------------|
| Pitch Deck | Demo Video Recording | Demo Video Recording |
| Final Prototype | Hardware Projection | Final Prototype |
| Hardware Coding | Hardware Coding | Hardware Coding |

Members final contributions

SMART HOME STOCK - Software & design team

| Vera Amaral | Henrique Simões | Leonor Mira |
|--------------------------------|---------------------|------------------------------|
| Web Development and Management | Web Development | Pitch Deck |
| Demo Video Recording/Editing | App Development | Poster |
| Poster | Hardware Projection | Demo Video Recording/Editing |



Final stretch challenges

Final stretch challenges

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- Learning how to use Expo to program mobile App.
- Malfunctioning hardware.
- Synchronization between camera and scale.





Final schedule deviations

Final schedule deviations - Causes

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Documentation
wasn't always
clear and didn't
always align
with our needs



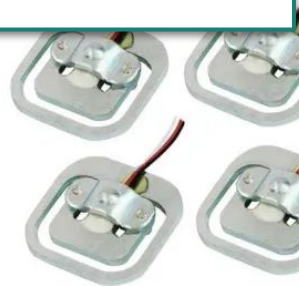
The need to
learn mobile
app
programming
from scratch



Introducing a
new ESP32
was a late
realization



Hardware
optimization,
specifically the
functioning of
the load cells



Personal
commitments
and workload





Final schedule



Contact

 smarthomestockshs@gmail.com

Website

 [Smart Home Stock Website](#)

Demo Video

 [Smart Home Stock Demo Video](#)