ElectroCap Pitch Deck

Group 30

Intelligent Post Box:
A remote monitoring solution for residential buildings

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Team

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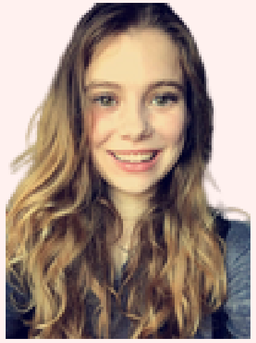
Advisors and Mentor

Coordinator:
Prof. Duarte Mesquita e Sousa

PhD Program in Electrical and Computer Engineering



Mentor:
Miriam Demasi

Master’s in Energy Engineering and Management

Partners

We have two partners that helped us throughout this project:

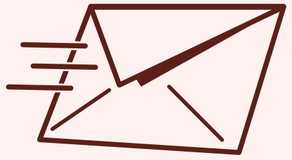
- Inovlabs - using their laboratory
- Seguramente - monetary support

Problem Definition

Managing post box access and tracking incoming mail can be challenging.

Missed deliveries

Unnecessary trips to the mailbox



Issues with lost or stolen mail

No effective system to remotely track the status of their post boxes

Lack of real-time monitoring

Many postal services and residents are looking for **innovative** ways to improve mail delivery and tracking, creating an opportunity for an intelligent, automated system.

Competitors and previous work

COMPETITORS

- Super e-Technology Services Limited;
- The Safety Letterbox Company LTD;
- Handover;
- ShipRite;
- Locky;

PREVIOUS WORK

- Parcels Boxes

Our project is different from the others in terms of:

PRICE

Cheaper because of the simpler materials

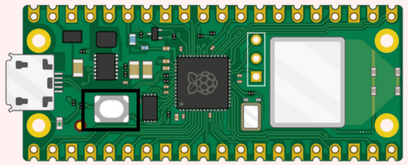
ENERGY

Consumption is lower because of the materials used

OPTIONS

The customer can choose whether they want a complete box, just the camera and sensors or just the camera or the sensor.

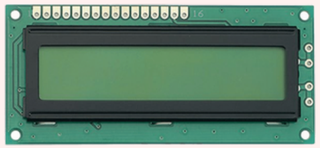
Technological solution



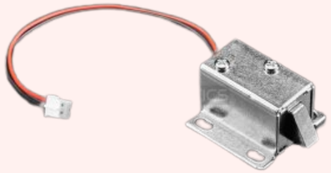
Raspberry Pi Pico W - Microcontroller that controlls the camera and smart lock.

The PIR motion sensor - Detects movement by sensing infrared radiation changes

3*4 keypad module - For opening the door.

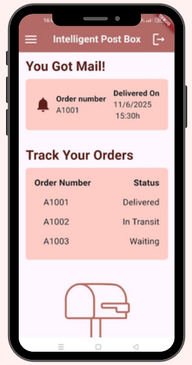


LCD Display - Shows the password, delivery instructions .



Electric Lock - Unlocks Mailbox when correct password is entered

5 Mpx Camera - Identifies the delivery, safety purpose.



Application with notification system

Built using:

Flutter

Firebase

Solution

→ A **low-cost** solution was essential for economic viability. So we minimized costs in our component choices.

→ Real-time notification system to avoid unnecessary trips to the mailbox

→ Take a photo of the delivered parcel
→ Potentially identify the parcel
→ Send the image to the recipient via the app
→ Adds **security** and user convenience

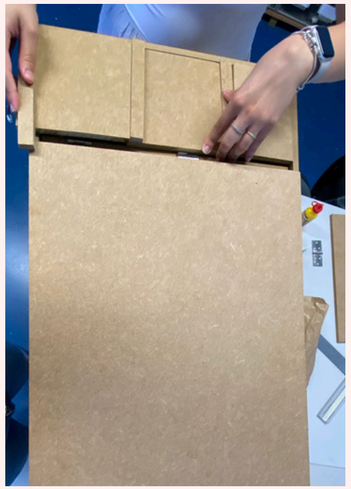
→**Low power consumption** makes it ideal for lowering total power usage for sustainability and autonomy

Target Audience

Our target audience consists of:

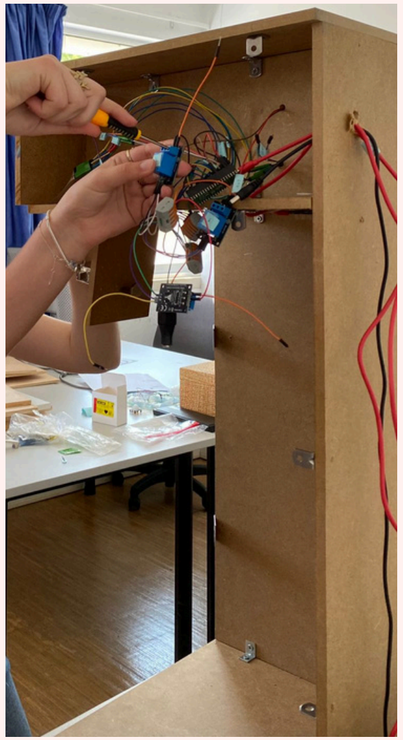
- Apartment residents;
- Building managers;
- Delivery people.

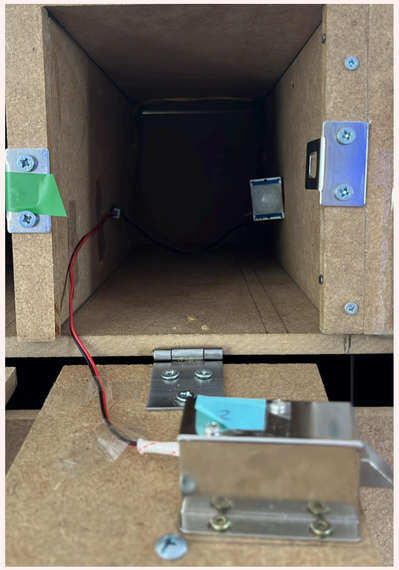
Achieved Results



We built our mailboxes so that we can show our working poject.
We decided on building two letter boxes, one for each apartment, and one package box, to be shared by all the apartments in the building.

Achieved Results

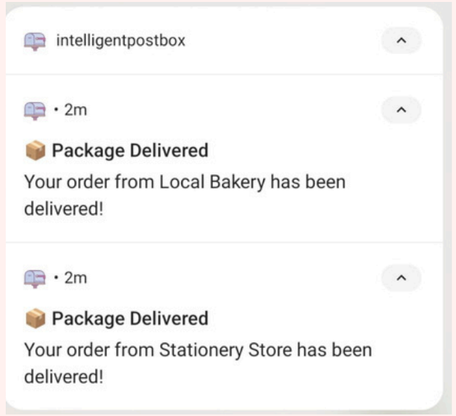




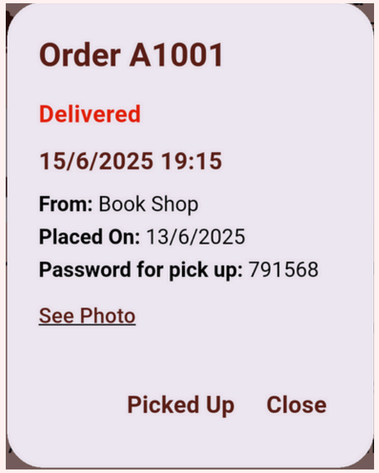
In the electronics part we implemented the LCD display and keypad for putting in the password that triggers the opening of the corresponding lock.
We also included sensors in the letter boxes, to notify the corresponding client when a letter arrives, and a camera in the package box, to send a photo of the delivered package to the application.

Achieved Results

We developed our application, both on the client side and the distributor side, and implemented our notification system so that a client can be notified when a package or letter arrives.

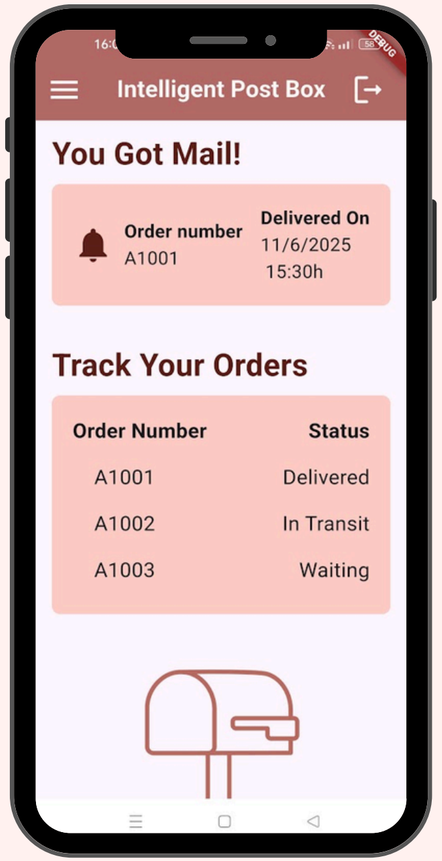


Notifications

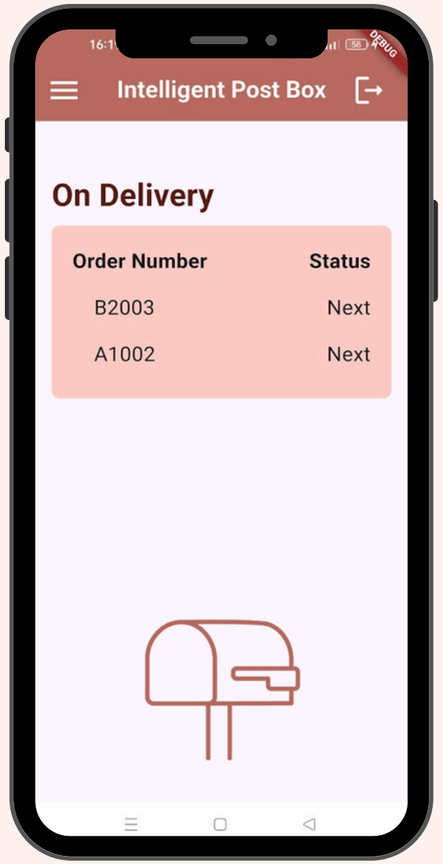


Client Order

Client Home



Distributor Home



Costs and Benefits

Costs

Small Mailbox:

≈**45€** for sensor + microcontroller

This version could be installed in existing mailboxes.

Big Mailbox:

≈**120€** for general sytem materials

+

≈**120€** per parcel box in system

Benefits

Immediate delivery notification

Photo proof of delivery for parcels

Secure parcel storage

No need to be present for deliveries

Contribution of each team member (I)

Ludmylla Wonsoscky

Eletronics Engineer

- Supervision, Organization and Division of Group Work
- Prototype design (electronic and physical), research and choice of materials
- Mailbox Construction
- Keypad and LCD Implementation
- Power Source and wiring System
- Interviews and Forms

Carolina Lopes

Eletronics Engineer

- Camera control programming on Raspberry Pi
- Research on compatible cameras for the Raspberry Pi system
- Mailbox Construction
- Comunication Materials

Chencheng Liu

Eletronics Engineer

- Locks implementation
- Sensors Implementation
- Box Design
- Interviews

Contribution of each team member (II)

Beatriz Moreira

Front-end Developer

- Website Design and Creation
- Blog Updates
- Application Development
- Mailbox Construction
- Interviews and Forms
- Comunication Materials

Sofia Nunes

Back-end Developer

- Application Design & Prototype
- Database Development and Application Integration
- Mailbox Construction
- Interviews
- Camera Integration
- Comunication Materials

Pedro Yin

Eletronics Engineer

- Locks Implementation
- Sensors Implementation

Important links

Website: https://web2.tecnico.ulisboa.pt/ist1107010/IntelligentPostBox/home.html#home

Blog: https://web2.tecnico.ulisboa.pt/ist1107010/IntelligentPostBox/blog.html#latest

Video: https://www.youtube.com/watch?v=AOZFXghBa5Y