ElectroCap Final Pitch Deck – Group 26

Automatic inventory checking

Francisco Rosa
(ist1102546)

António Oliveira
(ist1103515)

Filipe Mendes
(ist1102978)

André Marrazes
(ist1103520)

Duarte Pardal
(ist1102982)

Miguel Oliveira
(ist1103551)

TÉCNICO LISBOA
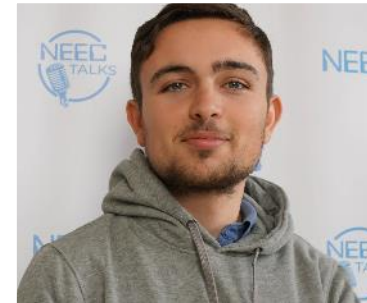
Team

André Marrazes

Filipe Mendes

António Oliveira

Duarte Pardal

Francisco Rosa

Miguel Oliveira

Advisors and Mentors

Scientific Advisor/ Coordinator

Prof. Luís Correia


Co-coordinator

Prof. João Felício

Problem definition (I)

- Nowadays, people who use mobile inventories face the problem of equipment loss.

- Many of these workers carry items on their vans and have little way of knowing if, where and when they get lost.

Problem definition (II)

- The existing solutions are limited by their price, lack of portability, and its difficult use. As a result, the usage of these systems is not common practice with small businesses or individuals.
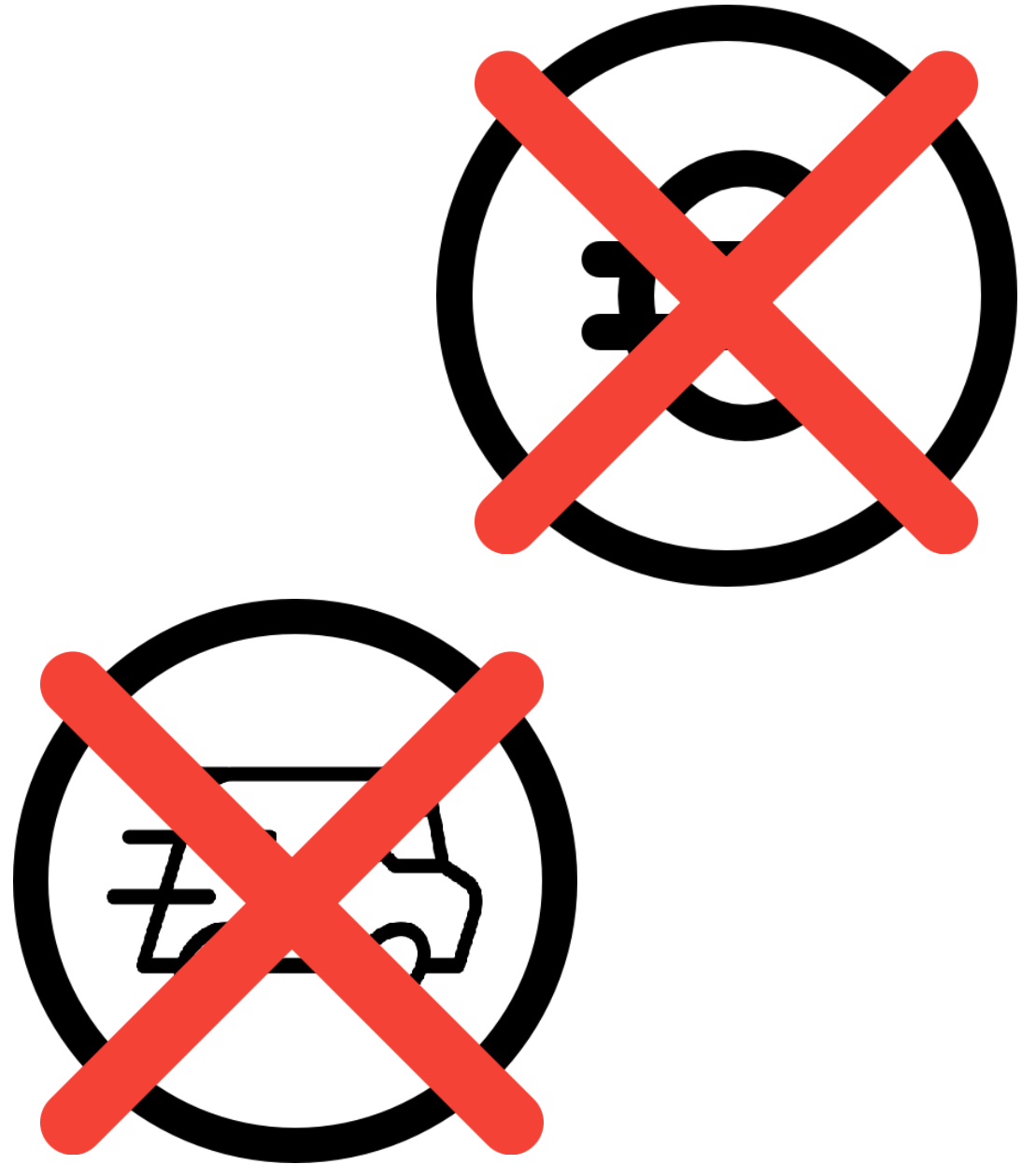
Solution beneficiaries

This solution can be beneficial to jobs that require the transportation of equipment, like shipping companies or storage facilities or professionals such as:

- Vets;
- Musicians,
- Service installers;
- Maintenance technicians.
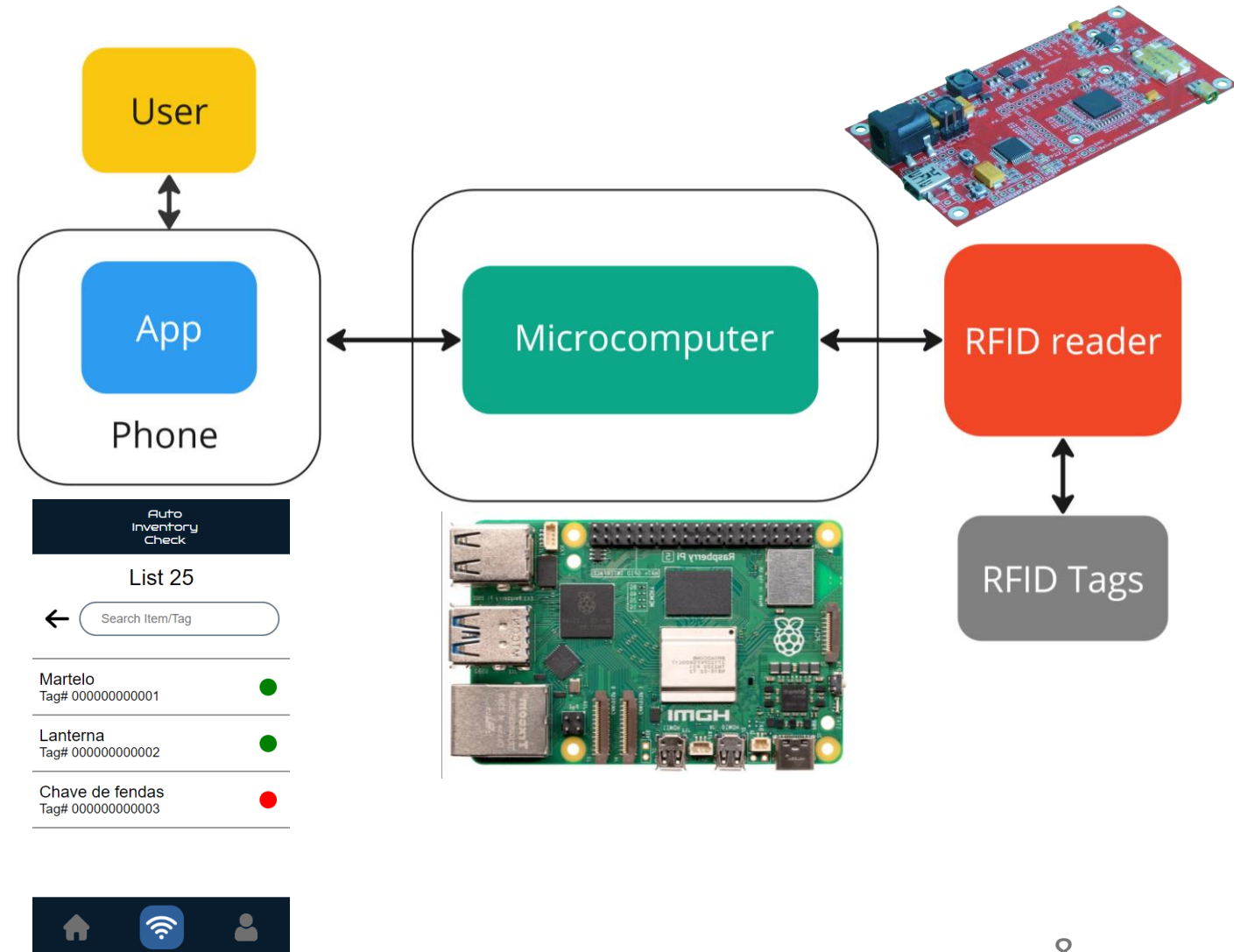
Technological solution (I)

Imagine the following situation:

- A electrician carries tools around in a van;

- While visiting a client, he loses a multimeter, and does not check for it;

- A few days after, he realises he has lost the tool, but doesn't remember where;

With our solution, there is a way to easily check items, avoiding situations like this.

Technological solution (II)

- The reader (made up of a microcomputer and a RFID module) interrogates the tags placed in the items;

- When the signal broadcasted hits a tag, it responds with its ID, indicating that the item is present;

- The reader sends the list of detected tags to the app via Bluetooth.
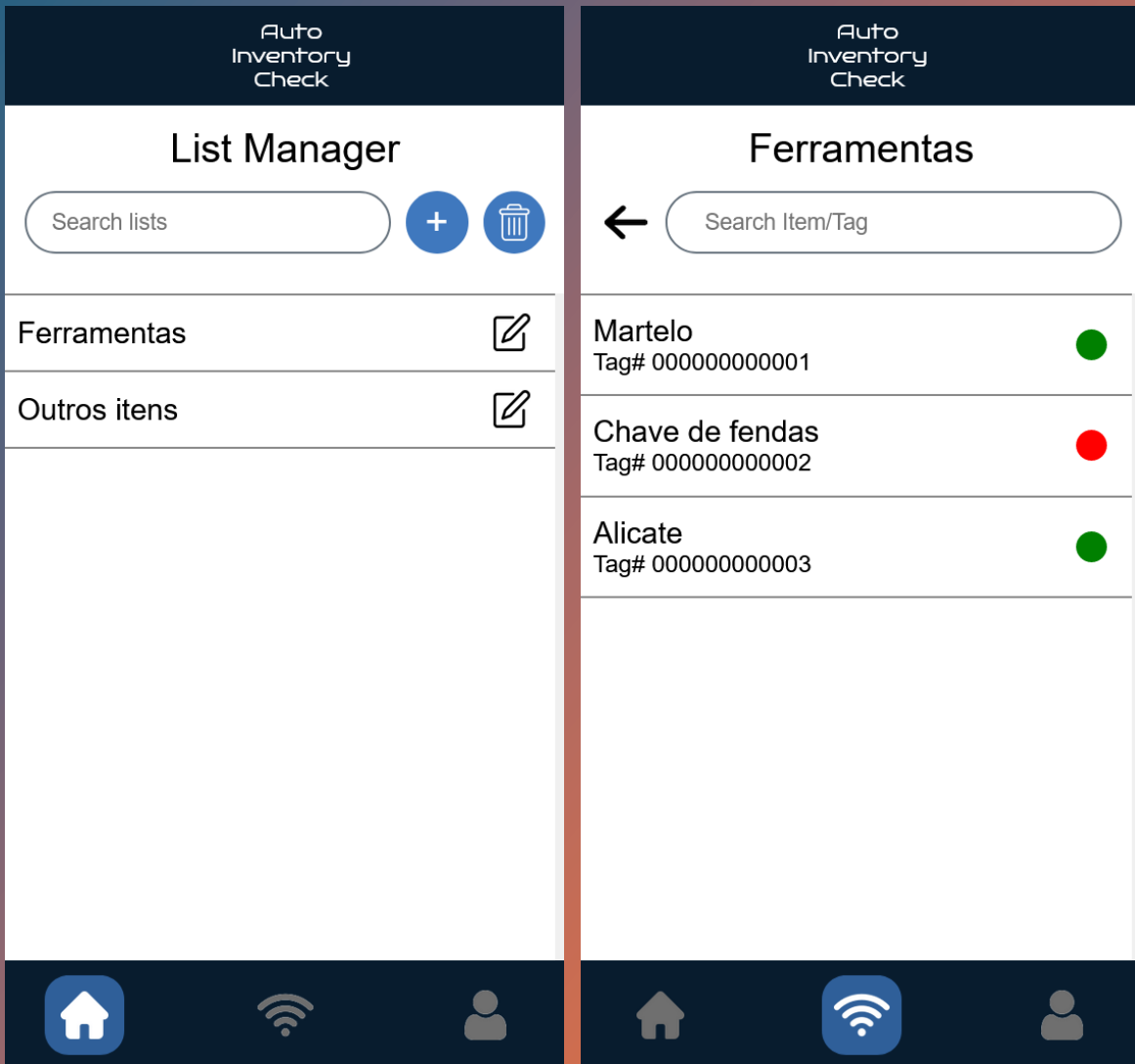
Technological solution (III)

- The user requests the readings in the app;
- The app will then receive information about which items are, or not, present within reading range.
- The user can then see for each list which items are present or absent, and where and when the lost item was read the last time.

Competitors and previous work

Competitors

SmartVan

Sortly

Mobile Inventory Software For HVAC And Plumbing Contractor

Zetes - RFID in Supply Chain

RFID-based Smart Blood Stock System

Previous work

Handheld reader using NFC and BLE (SmartVan) or QR or bar codes (Sortly and Mobile Inventory Software);

RFID identification using fixed gates or handheld readers (Zetes)

RFID blood bag identification, with Bluetooth communication with an external device

Achieved results (I)

- App-Reader communication (via Bluetooth);

- Reliable reading of multiple tags;

- Easy to use app, compatible with most devices;

- Maximum reading range of 0.75m (open range);

- Working conditions for various materials (plastic, cardboard, glass, styrofoam).

- 3D printed case (13x8x6.5cm) to lodge the device

Achieved results (II)

Tag detection performance for various materials
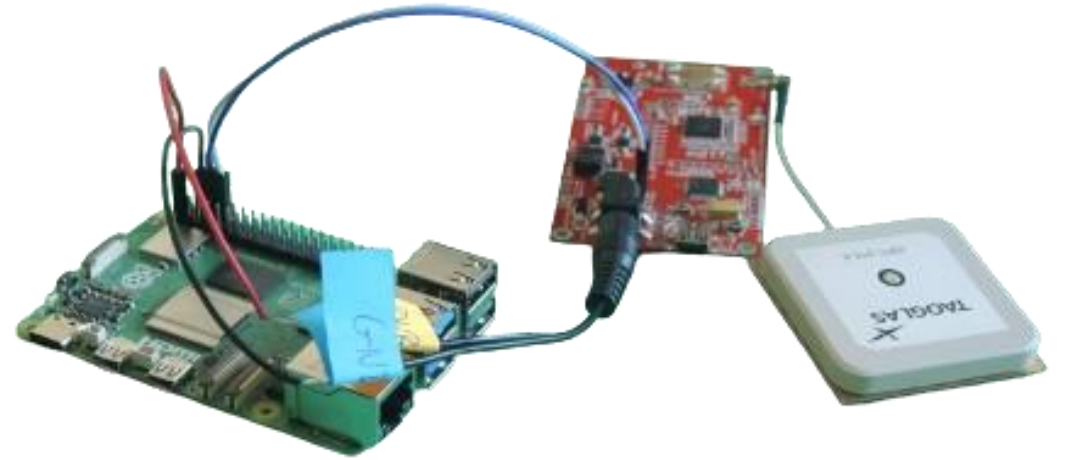
Regarding the system's operational capabilities, the maximum tag detection range for tags placed on various materials are:

- Suspended in air: 80 cm;
- Cardboard: 75 cm;
- Expanded polystyrene: 80 cm;
- Low-density polyethylene: 75 cm;
- Wood: 55 cm;
- Glass: 40 cm;
- Aluminium: [readings always failed].
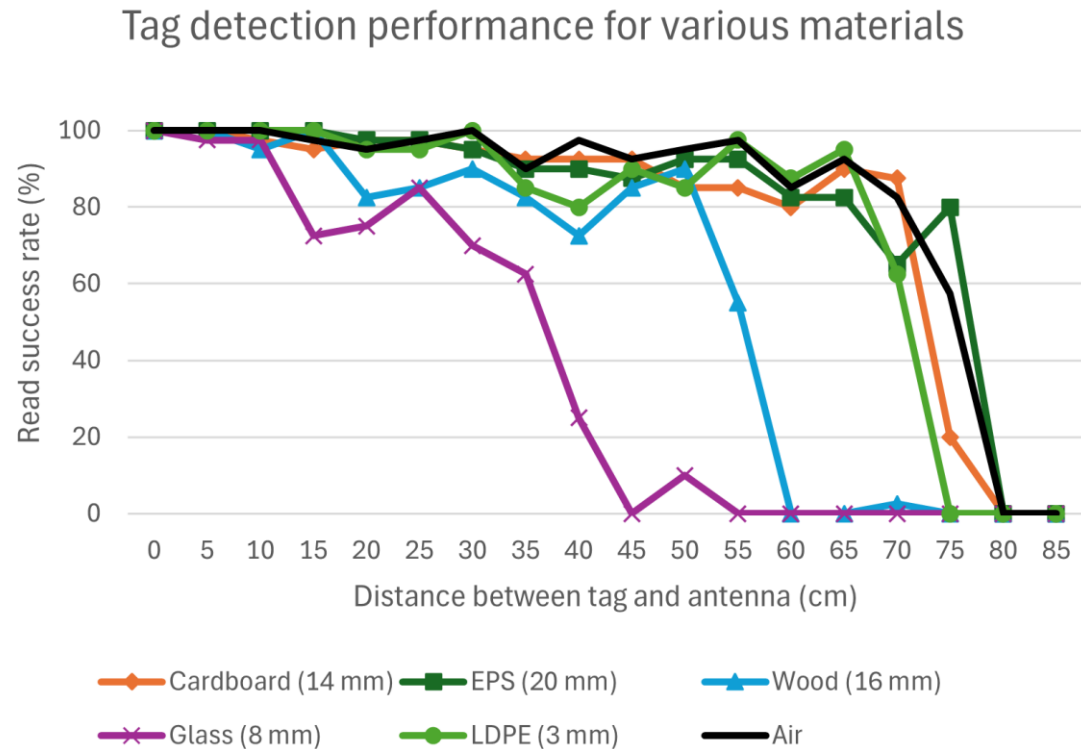
Challenges faced by the team

- Difficulties in understanding and implementing app-board communication (D-Bus, *bluez*);
- Getting the website to be responsive and functional in various platforms;
- Finding an available and adequate RFID reader, antenna and tags.

Costs and benefits (I)

Costs:

- **Project material:**
  - Raspberry Pi 5: 90€
  - AS3992 RFID reader: 250€
  - Antenna RF SOLUTIONS ANT-PCB4242-FL: 21€
  - Tags: 4€
- Case filament for 3D printing: 22€
- Jumper cables and supply sources: 15€

Total Cost: 402€

Costs and benefits (II)

The main benefits identified are:

- Reliable reading of tags allows for easy inventory verification;
- This verification allows for cost reduction (both due to time and equipment savings);
- For hazardous or emergency equipment, safety may be improved;
- Security improvements (decrease in thefts);
- Item management data could improve inventory allocation.

Contribution of each team member (I)

Francisco	Filipe	Duarte
Coordination and Electronics	**Website**	**App & Microcomputer Programming**
System and electrical sizing	Website Design and Implementation	App BLE communication and finishing touches on the app
Poster and pitch decks	Blog	Microcomputer BLE communication code
Hardware research and assembling	App UI development	Hardware and software decision-making
Task management		Video recording
RFID reader-microcomputer communication	Video editing	RFID testing

Contribution of each team member (II)

António	André	Miguel
App	**Website**	**App-Board Communication**
App Concept and Design	Website Design and Implementation	BLE Connection Research
App UI development	Blog	App-Board communication
App Navigation	App UI development	Audio Recording and Video Editing
3D Modelling	Video Script	3D Printing

More information

Landing page:
https://web.tecnico.ulisboa.pt/ist1102978/

Video: https://youtu.be/QCqdaw_nsU4

Blog:
https://web.tecnico.ulisboa.pt/ist1102978/blog.html
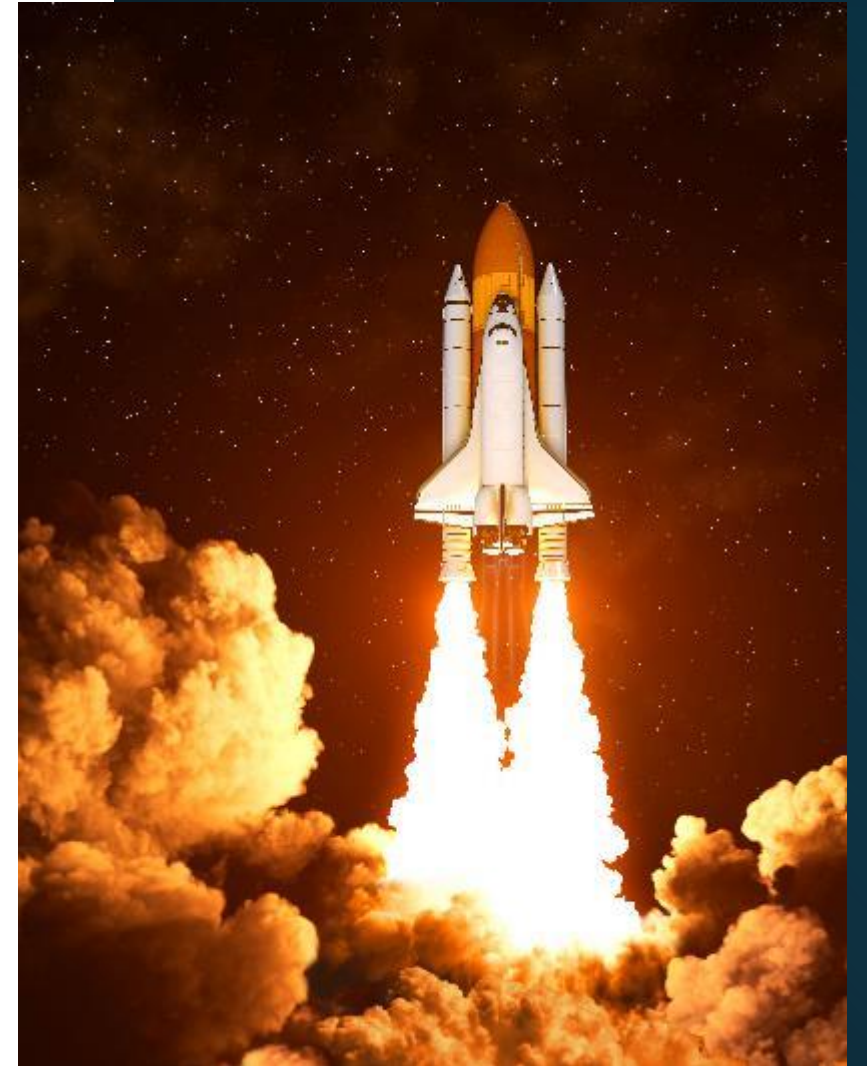
ElectroCap Final Pitch Deck – Group 26

Automatic inventory checking

Francisco Rosa
(ist1102546)

Filipe Mendes
(ist1102978)

Duarte Pardal
(ist1102982)

António Oliveira
(ist1103515)

André Marrazes
(ist1103520)

Miguel Oliveira
(ist1103551)

TÉCNICO LISBOA