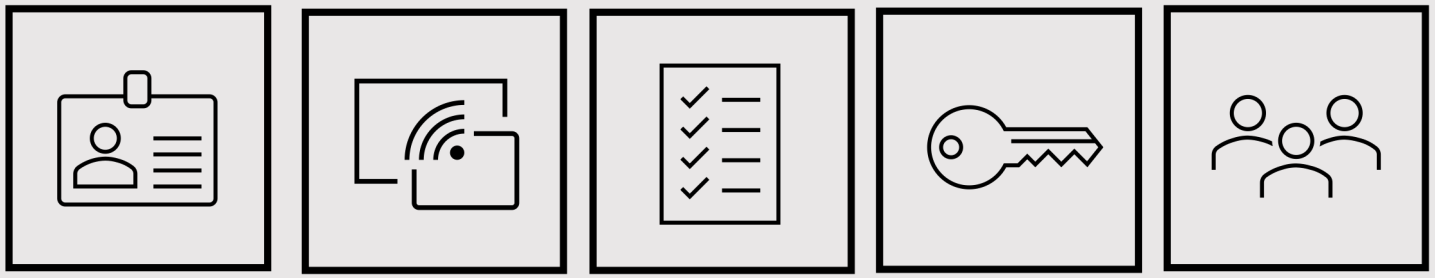

SEKEYRITY

PIC1 Access Management

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Miguel Andrade
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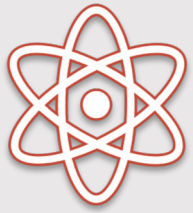
TÉCNICO LISBOA

ADVISORS AND MENTORS



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Mentor

MEET THE TEAM

BRUNA FERREIRA

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AFONSO COELHO

ANTÓNIO RIBEIRO

MIGUEL AMEIXA

JOÃO BARROS

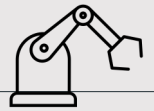
PROBLEM DEFINITION

- **IDENTIFIED PROBLEM:** Accessing NEEC (Núcleo de Estudantes de Engenharia Eletrotécnica e de Computadores) rooms in the North Tower requires manual key management.

- **CURRENT PROCESS:** Users request keys from the security guard at the tower's reception. The guard manually checks a list and records key transactions, leading to inefficiencies and discrepancies.

- **INCONVENIENCE:** Variability exists among guards regarding key return policies, causing confusion and inconvenience for users. Forgotten key returns result in issues for both users and security staff.

- **WIDESPREAD ISSUE:** Similar challenges exist in accessing other rooms, affecting students, teachers, and staff.



- **AUTOMATION OPPORTUNITY:** Automating key and access management processes would standardize and streamline operations.

SOLUTION BENEFICIARIES

Implementing an automated key and access management system would provide tangible benefits to multiple beneficiaries.

STUDENTS, TEACHERS, AND STAFF would experience streamlined access processes, reducing administrative burdens and improving efficiency.

SECURITY PERSONNEL would benefit from enhanced monitoring capabilities, gaining better control over access permissions, optimizing institutional ooperations.

The automation would lead to a more secure, efficient, and technologically advanced solution for all.

TECHNOLOGICAL SOLUTION

SeKEYrity - a card reader system that operates by accessing a centralized database that contains information about access privileges for each user.

1) When a **user interacts with the card reader**, they swipe their card, which is associated with their profile in the database.

2) After scanning the card using **RFID technology**, the card reader **communicates with the database in real-time** to verify the user's identity and access permissions.

3) If the database indicates that the **user is granted access** to the selected room or area, the card reader immediately authorizes entry and activates the release mechanism for the corresponding key.

4) Conversely, if the database indicates that the **user does not have the necessary access privileges**, the card reader denies entry and prevents the key from being released.

In summary, the card reader system relies on a secure and up-to-date database to determine whether a user is granted access or not, ensuring that only authorized individuals can enter designated areas.

COMPETITORS AND PREVIOUS WORK

- **Smart Lock**

In the domain of access control and management solutions, one prevalent alternative in the market are smart locks, offered by established entities such as **iLockey**, **Allegion Plc**, and **Onity, Inc**.

An intriguing metric to evaluate our solution's competitiveness against these alternatives is its **cost-effectiveness** in relation to the required number of doors or keys.

SOLUTION REQUIREMENTS

The solution requirements for SeKEYrity encompass several crucial aspects to tackle the identified challenges in key and access management.

- **Functionality-wise**: accurate real-time user identity verification and access privilege confirmation
- **Seamless integration** with key dispensation infrastructure

- **Optimal performance** with minimal downtime and fast response times
- **Intuitive interface** for both users and administrators
- **Robust security** measures to prevent unauthorized access

- **Compatibility** with existing systems, particularly physical keys
- **Scalability** to accommodate future expansions

TECHNICAL CHALLENGES

The SeKEYrity project encounters several technical challenges that demand innovative solutions.

- **ESTABLISH A ROBUST AND ACCESSIBLE DATABASE:**
  - Efficient handling of real-time data updates
  - Ensuring data integrity and accurate access validation
  - Accessibility for quick information retrieval
  - Adaptability to accommodate changes in access permissions

- **COMPACTING THE ENTIRE SYSTEM:**
  - Optimizing hardware and software components
  - Reducing physical space requirements
  - Maintaining or improving functionality and performance
  - Streamlining code to minimize resource usage

- **DESIGNING A COMPACT AND PRACTICAL KEY HOLDER:**
  - Creating a small yet durable key holder
  - Effective dispensation of keys to authorized users
  - Accurate identification and storage of keys upon return

TESTING AND VALIDATION METRICS

Testing and validation metrics serve as essential benchmarks to evaluate the performance and quality of the SeKEYrity system throughout its testing and validation phases.

- **USER INPUT ACCURACY**
  - Accurate interpretation of desired key numbers entered on the keyboard

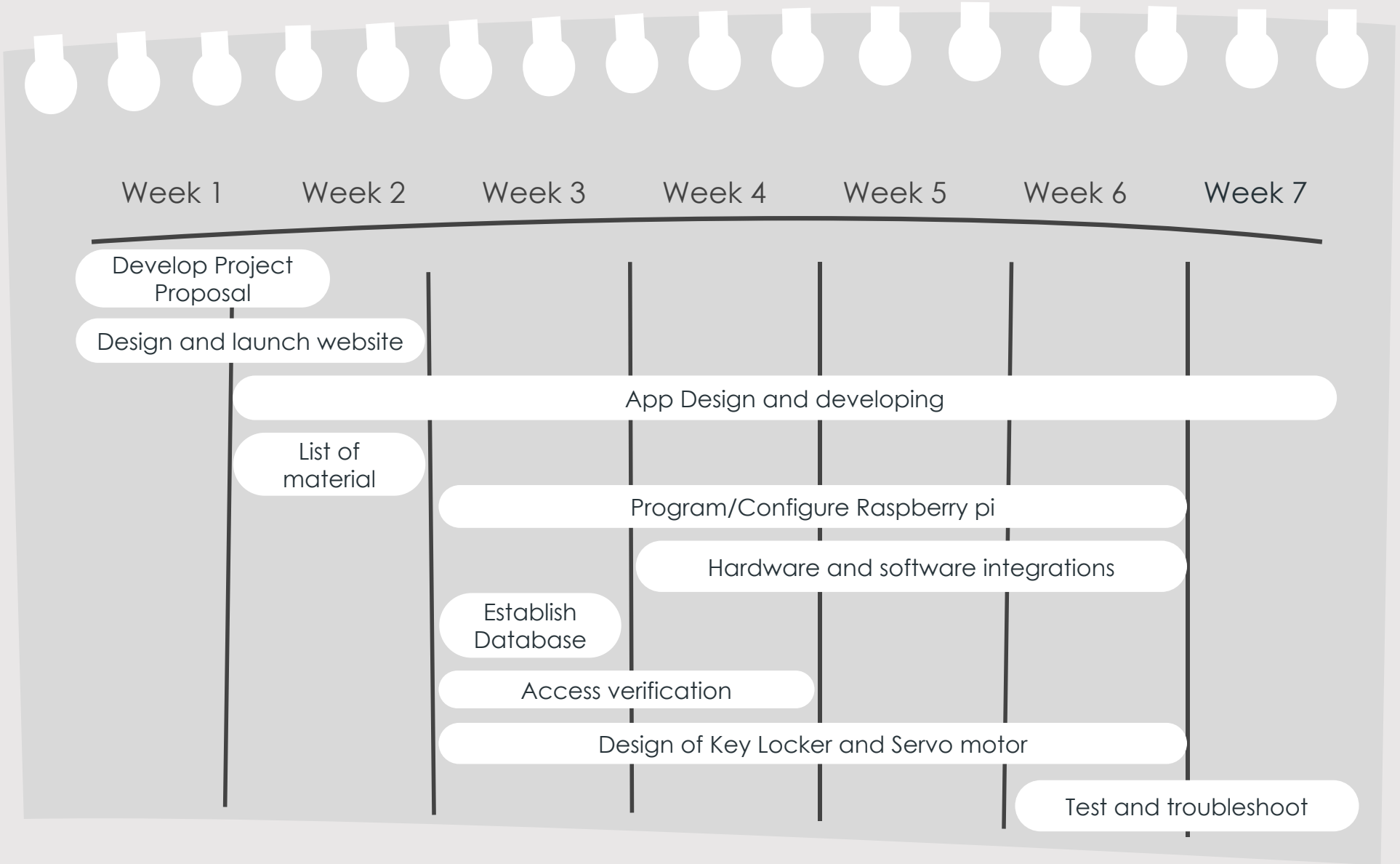
- **CARD READER FUNCTIONALITY:**
  - Effective reading of user cards
  - Matching cards with registered profiles
  - Prompting registration for unregistered users
  - Verifying access privileges for registered users

- **REAL-TIME COMMUNICATION:**
  - Swift access and updating of information in the database

- **CLEAR ON-SCREEN FEEDBACK:**
  - Providing clear feedback on access status

- **DISPENSING MECHANISM RELIABILITY:**
  - Reliable delivery of keys to authorized users

ORIGINAL SCHEDULE



MID-PROGRAM STATUS

Since the project's inception, we have:

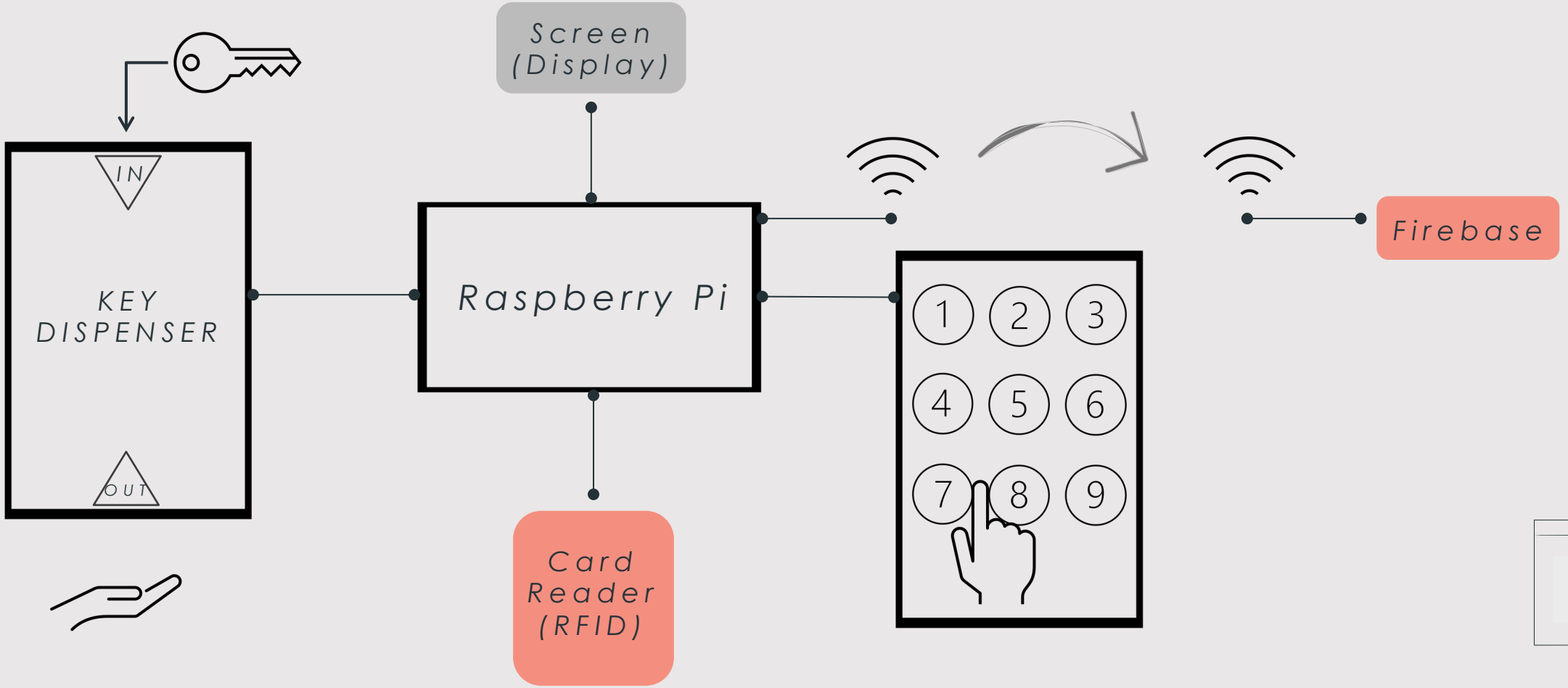
- **Transitioned our focus** from warehouse stock management to addressing manual key and access management issues at Técnico's North Tower. This shift was prompted by a thorough evaluation of our initial concept and feedback from our advisor, revealing the impracticality of our original idea due to RFID limitations and time constraints. As a result, we redirected our efforts towards implementing an automated key and access management system called SeKEYrity.

- **Established the system's operation and structure**: users input a key number on a keyboard, scan their card, and the reader verifies access privileges in the database. If granted, the key is provided; otherwise, a message is displayed.

- **Made significant progress** by crafting initial versions of crucial components vital to our system's functionality. These include the **development of preliminary versions of the database, keyboard interface, and key storage box.**

MID-PROGRAM STATUS

SYSTEM'S OPERATION AND STRUCTURE

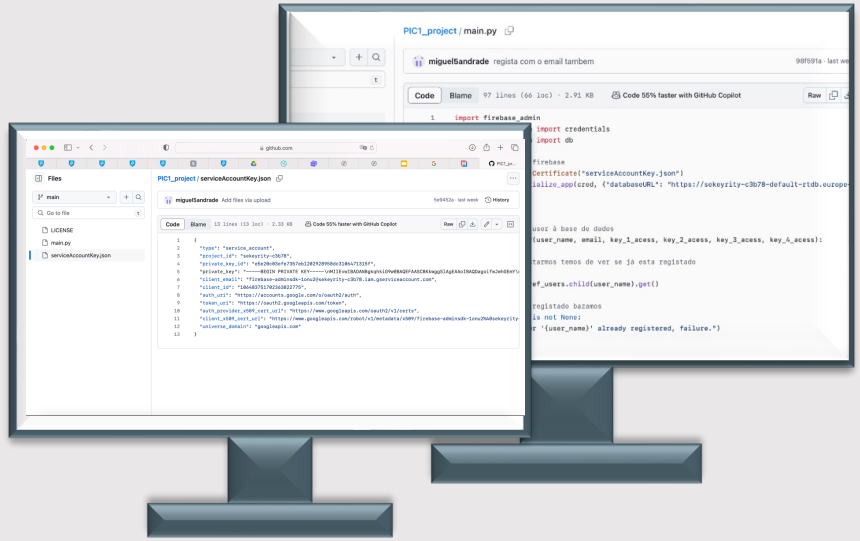


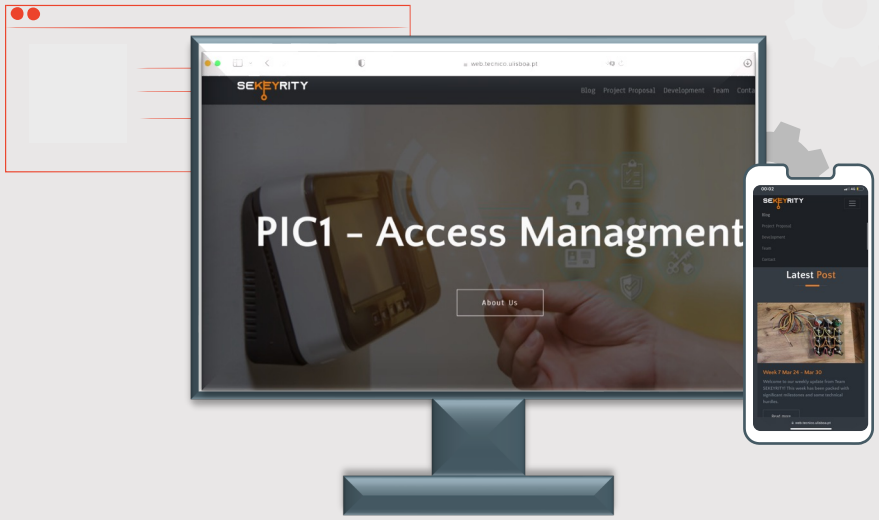
ACHIEVED RESULTS (1/3)

APP DESIGN

Developed initial iterations of the application, particularly tailored for key reservation purposes.

ANTÓNIO RIBEIRO





WEB SITE DEVELOPMENT

Designed and launched a public website to centralize project information, encompassing our project proposal and weekly blog updates

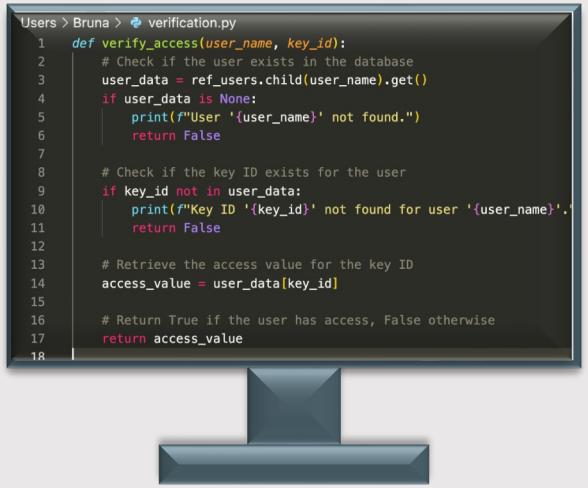
BRUNA FERREIRA & MIGUEL AMEIXA

DATA BASE

Established preliminary versions of the database where users are registered and their permissions are recorded.

MIGUEL ANDRADE

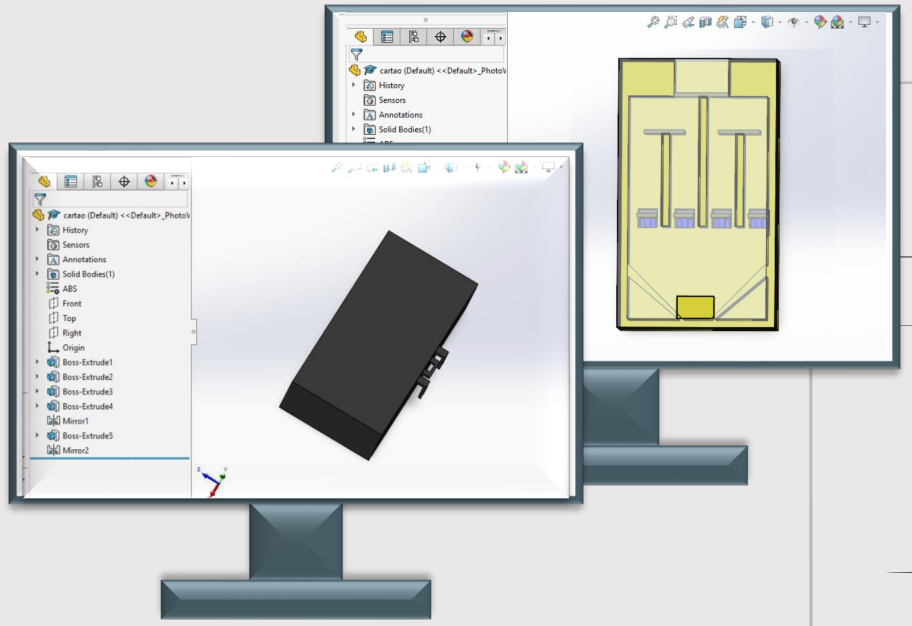
ACHIEVED RESULTS (2/3)



ACESS VERIFICATION

Implemented database functionalities to verify user access privileges for the specified key.

BRUNA FERREIRA



3D MODELING

Creation of 3D models for the key locker structure

JOÃO BARROS

KEYBOARD

Developed initial prototypes of the keyboard and showcased its functionality in accurately receiving user input for key numbers.

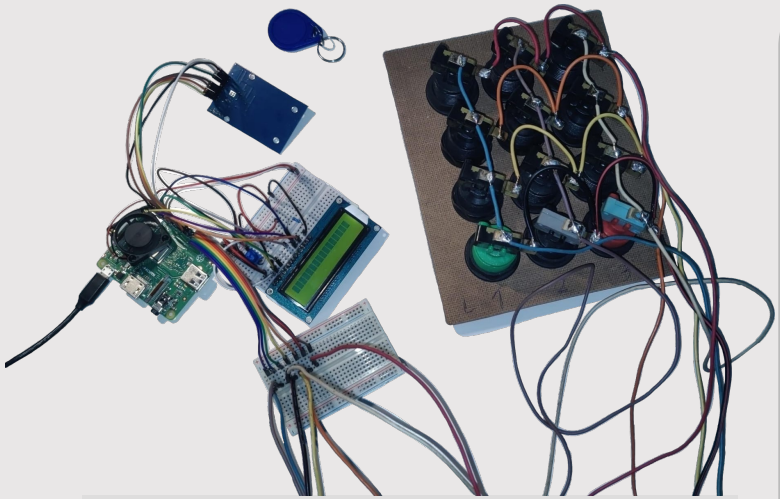
AFONSO COELHO

ACHIEVED RESULTS (3/3)

RASPBERRYPI

Boot, configuration and packages installation of raspberry pi

AFONSO COELHO



HARDWARE TEST

Hardware testing with the Raspberry Pi and initiation of final code development.

AFONSO COELHO

DISPENSER BOX

Building of a wooden box to house all electronic components and for the key dispenser.

ANTÓNIO RIBEIRO

CHALLENGES FACED BY THE TEAM

- **RASPBERRY PI PROGRAMMING:** Challenges arose due to the team's lack of experience and compatibility issues with hardware, leading them to ultimately opt for utilizing a previously used Raspberry Pi model as a workaround.

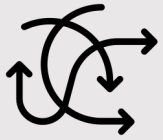
- **KEY STORAGE SYSTEM IMPLEMENTATION**: Designing a reliable key identification and storage system demanded thorough planning and testing to ensure its effectiveness.

- **MATERIAL CONSTRAINTS**: Inadequate materials and delayed specifications led to delayed requisition and unsuitable hardware, impeding project execution.

- **TIME MANAGEMENT**: Underestimating the complexity of certain tasks, compounded by conflicts in group members' schedules, posed challenges in allocating adequate time to this project, resulting in delays in its progress.

DEVIATIONS FROM ORIGINAL SCHEDULE

- **Delayed Project Specification**: The project's delayed specification and unclear objectives led to ambiguity, hindering the prompt definition of tasks and resource allocation.



- **Unpreparedness for Technical Challenges**: The team encountered unforeseen technical challenges, including p ackage incompatibility within Raspberry Pi and inadequate materials.

- **Personal Commitments and Workload**: Team members' personal commitments and workload from other academic obligations strained project timelines, resulting in inconsistent progress and delayed completion.

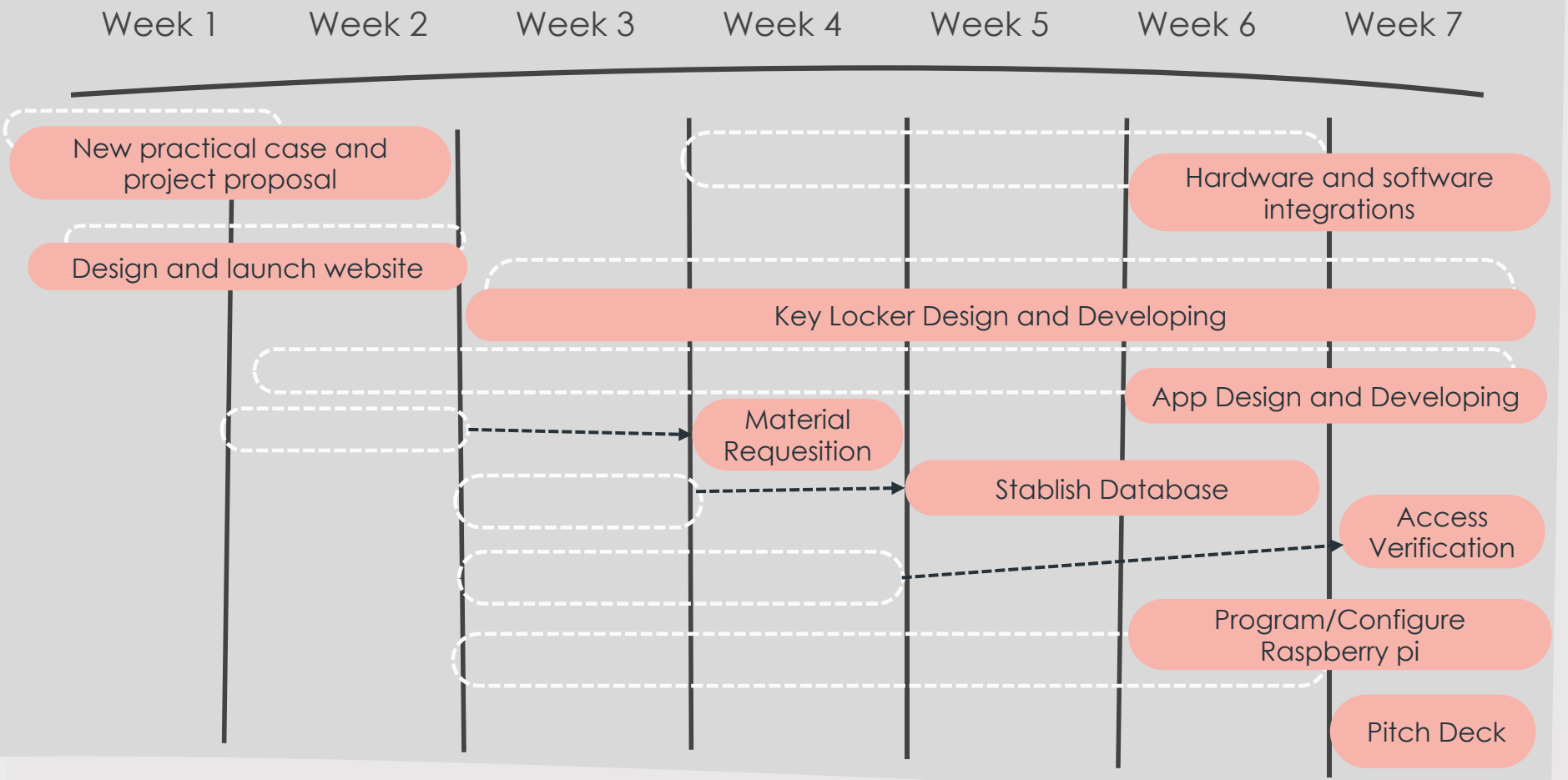
DIVISON OF LABOR AND CONTRIBUTION OF EACH TEAM MEMBER (1/2)

BRUNA FERREIRA	MIGUEL ANDRADE	AFONSO COELHO
Website and Communication	***Data Base and User Interface***	***Hardware***
Project Proposal	Project Proposal	Project Proposal
Website Design and Maintenance	Research Data Base options	Configuration of Raspberry Pi
Weekly Blog Updates	Development of Data Base	Development of keyboard
Data Base - User Access Verification	Interface between Hardware and Software	Establish hardware components connection
Mid-program Pitch Deck		

DIVISON OF LABOR AND CONTRIBUTION OF EACH TEAM MEMBER (2/2)

ANTÓNIO RIBEIRO	MIGUEL AMEIXA	JOÃO BARROS
App and Design	***Servo Motor Modelation***	***3D Modelation***
Project Proposal	Website Creation	Key Locker Design
App development	Website Maintenance	Key Locker 3D Modelation
Logo Design	Servo motor movement Modelation	Key Locker Prototype Structure
Key Locker Prototype Structure		

CORRECTED SCHEDULE



ORIGINAL SCHEDULE

CORRECTED SCHEDULE

PREDICTED SCHEDULE