ElectroCap Mid-Program Pitch Deck

Escape the Room with IoT

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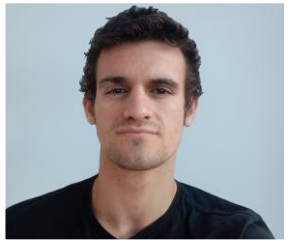
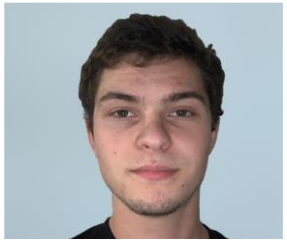
TÉCNICO LISBOA

Our Team - 29

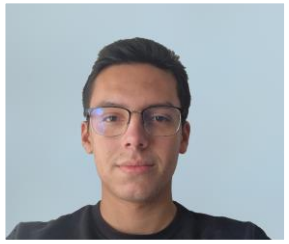


Gil Jardim
(Design Manager)

Rafael Santos
(Team Leader)



Rodrigo Campos
(Marketing Manager)



Gonçalo Baião
(Software Developer)

Gonçalo Firme
(Hardware Developer)

Tiago Nóbrega
(Build Manager)

Advisors and Mentors

Teresa Vazão

(Professora)

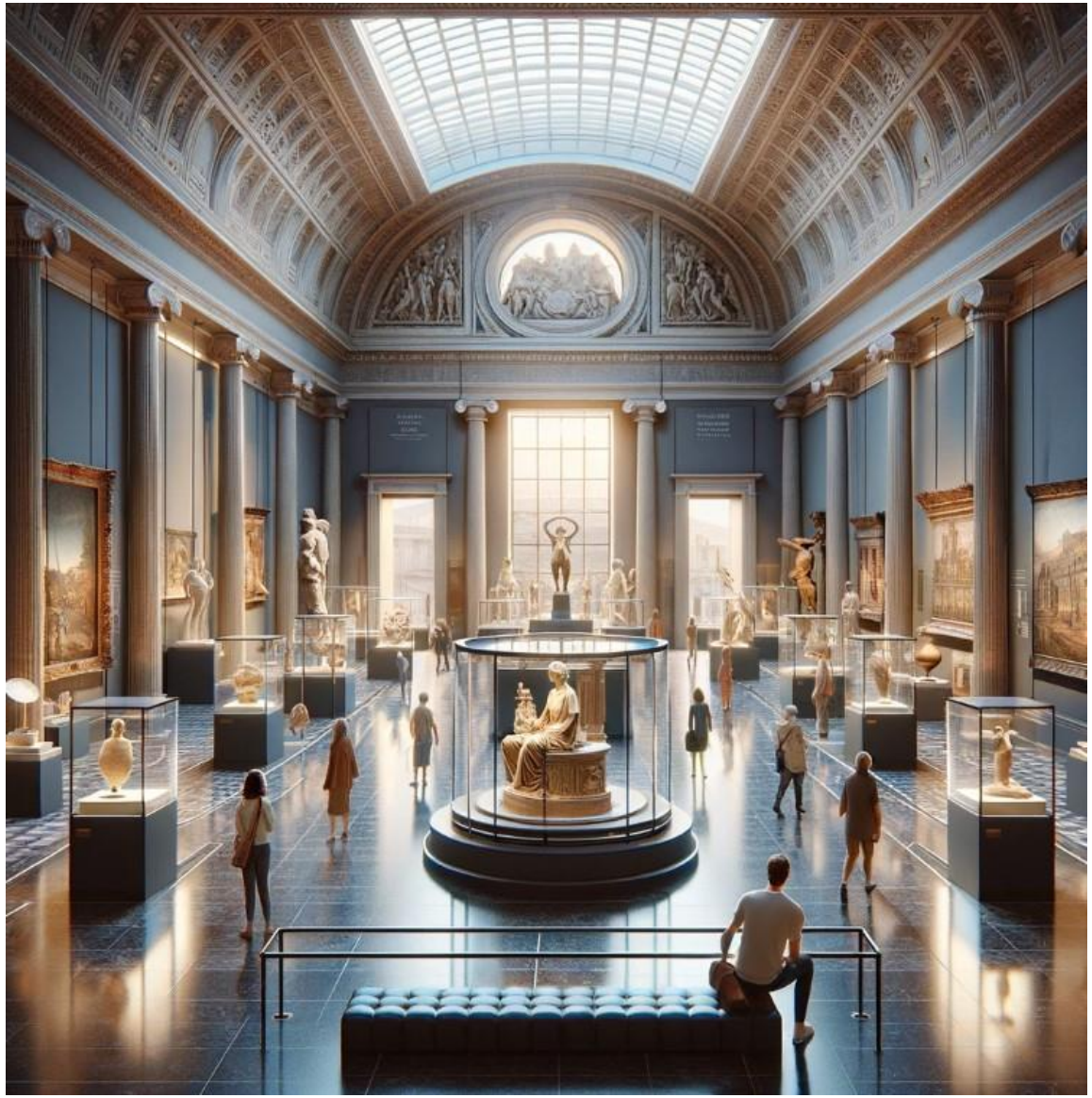
Ricardo Santos
(Professor Assistente)

Problem definition

- Youngsters don’t visit museums.
- Low information retention.

Lead to:

- Loss of Connection with History and Culture
- Lower Development of Critical and Creative Thinking
- No interesse in STEM



Solution beneficiaries

For Visitors:

+ Fun

+Memories

+Knowledge

For Museums:

+ Visitors

+Revenue

+Feedback

Technological solution

The proposed solution involves developing an escape the room using IoT to be implemented in a museum. For that:

- We aim for the museum visitors to be able to reexperience the escape the room, and for it to be different each time, changing the way it explains and explores the museum's theme.
- Various interactions will be created (puzzle pieces), however the dynamics between puzzles will be different for each game.

In the task implementation, many technologies can be used, such IoT for a connected environment. We will be using Arduinos, along with LEDs, breadboards, buzzers, and other related components.

Competitors and previous work

Competitors

- The Bridge Collection by White Rabbit escape the rooms
- Intelligent Entertainment
- X-Cube

Solution requirements

The solution:

- Has to be dynamic and unpredictable.
- His interactions and clues need to change each it is played.
- Must be flexibility and adaptability, so it can be applied into various contexts.
- *Its puzzles should be simple enough for* universal usability, ensuring accessibility for users of all backgrounds and levels of tech proficiency.

Technical challenges

- Working with technologies with which we have not yet had contact.
- Making the escape the room accessible to all age groups and foreign visitors.
- Ensuring that the puzzles are compatible with each other and with the room environment.
- Implementing all the ideas we've had.

Partners

Instituto Superior Técnico

Museu Faraday

Museu da Eletricidade

Testing and validation metrics

Visitor surveys can capture opinions on proposed activities, learning outcomes, and exhibit engagement time. Tracking statistics on attendance and time spent in the museum can assess overall interest. Paying specific attention to the opinions of young visitors, parents, and teachers, can also ensure a well-rounded understanding of the impact on diverse audience segments.

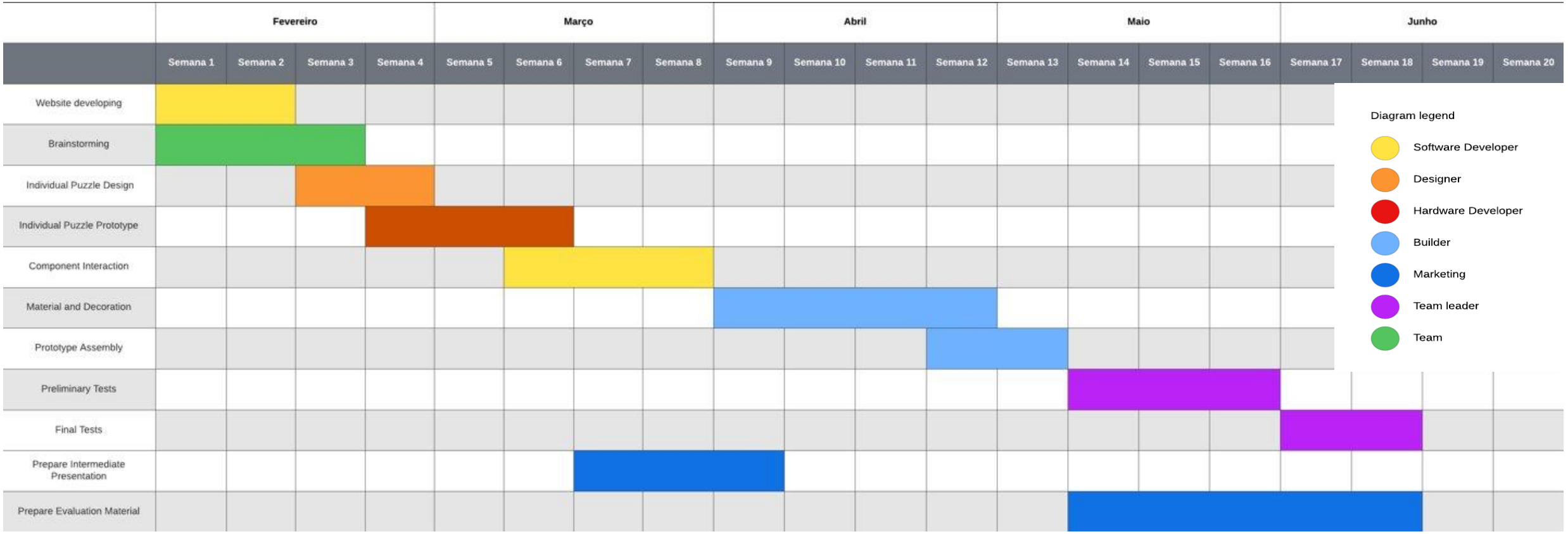
Division of labor (1)

Gil Jardim	Rafael Santos	Rodrigo Campos
Designer	**Team Leader**	**Marketing**
Brainstorm - Creation of interactions	Brainstorm - Creation of interactions	Brainstorm - Creation of interactions
Puzzle design	Testing the prototypes	Preparing the evaluation material
Sketching the hardware connections	Managing resources	Blog writing

Division of labor (2)

Gonçalo Baião	Gonçalo Firme	Tiago Nóbrega
Software Developer	**Hardware Developer**	**Building**
Brainstorm - Creation of interactions	Brainstorm - Creation of interactions	Brainstorm - Creation of interactions
Web page development	Hardware development	Arranging and sorting materials
Connections between individual puzzles	Software development (Programming microcontrollers)	Building puzzle prototypes

Schedule

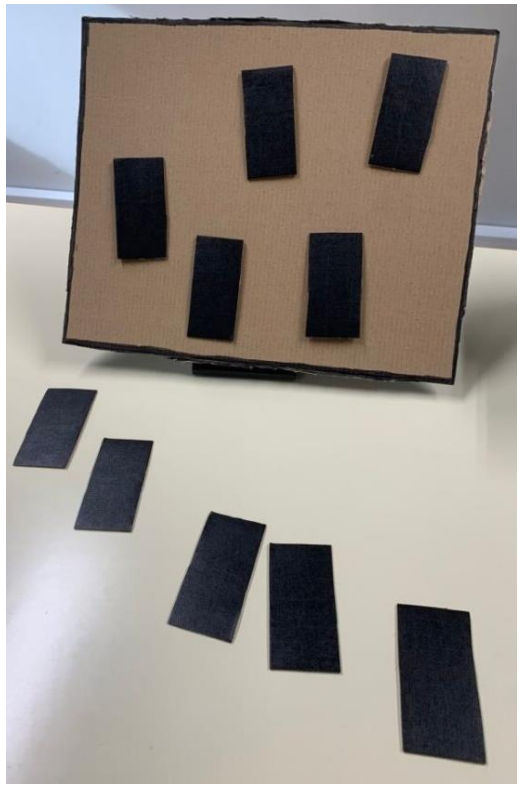

Fevereiro
Março
Abril
Maio
Junho
Semana 1
Semana 2
Semana 3
Semana 4
Semana 5
Semana 6
Semana 7
Semana 8
Semana 9
Semana 10
Semana 11
Semana 12
Semana 13
Semana 14
Semana 15
Semana 16
Semana 17
Semana 18
Semana 19
Semana 20
Website developing
Brainstorming
Individual Puzzle Design
Individual Puzzle Prototype
Component Interaction
Material and Decoration
Prototype Assembly
Preliminary Tests
Final Tests
Prepare Intermediate Presentation
Prepare Evaluation Material
Diagram legend
Software Developer
Designer
Hardware Developer
Builder
Marketing
Team leader
Team

Mid-program status

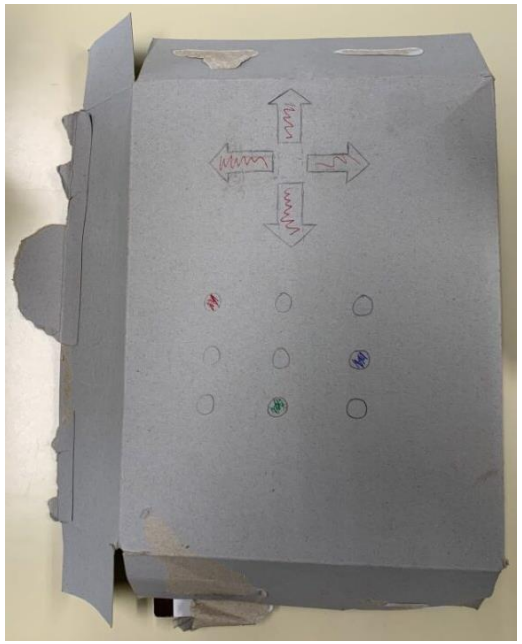
- The project has been advancing smoothly, with consistent progress week by week. We've successfully translated our ideas into action, enhancing them further through feedback from professors, and through the practical experience we've gained.
  - 1st week: We have developed the website, where we put our project information and started our own blog.
  - 2nd & 3rd week: Brainstorming.
  - 4th week: Cardboard models were made.
  - 5th week: 3D models were developed.
  - 6th week: Simple assemblies with some hardware components were made.
  - 7th week: A full escape the room interaction was developed.

Achieved results

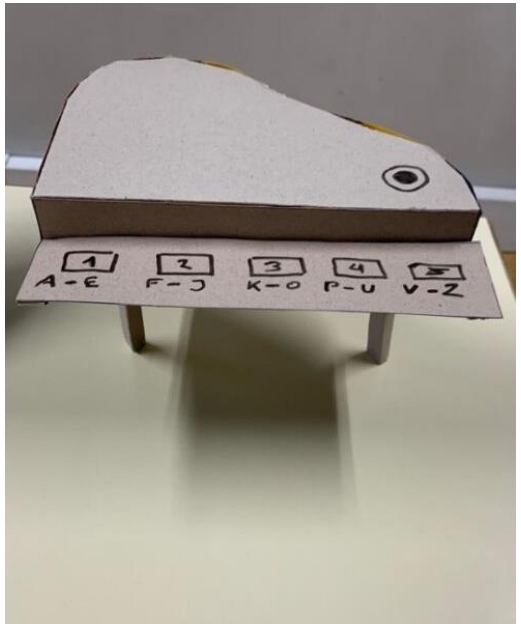
- We've established weekly goals and successfully achieved them.
- We researched on the data sheets of the materials we had access to. We learned to use the Arduino IDE application and the websites *tinkercad.com* and *SketchUp.com*, for electrical schematics and 3D printing, respectively.
- We presented the initial (cardboard) prototypes, the 3D models, and the simplified version of the games to the teachers.
- On February 12th, we launched our website, and we have been publishing weekly updates on our progress since then.
- Until now, we've maintained a calm and respectful working environment, as well as evenly distributed tasks among all members.



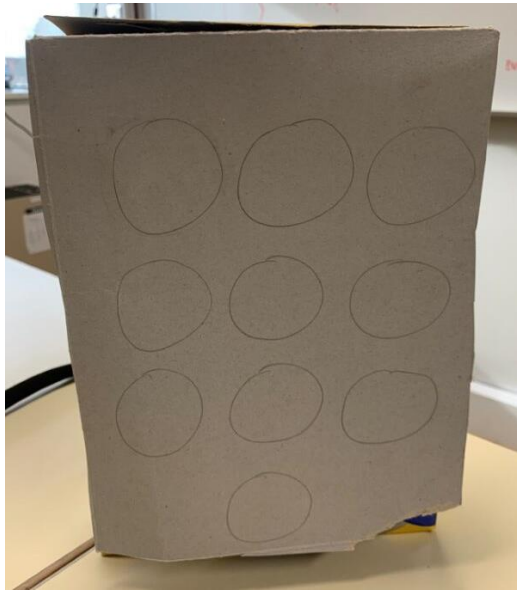
RFID cardboard model



LEDs display cardboard model



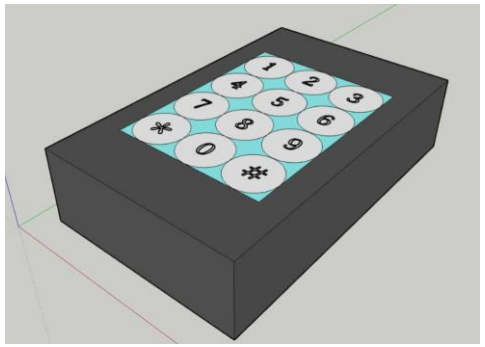
Piano cardboard model



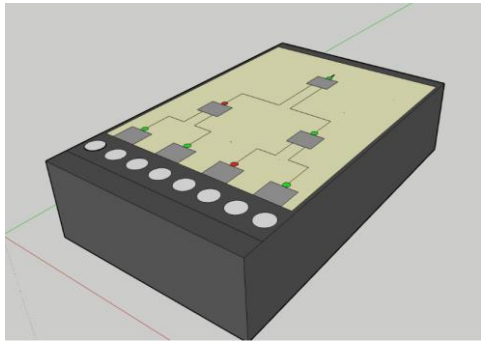
Keypad carboard model

Cardboard Prototypes

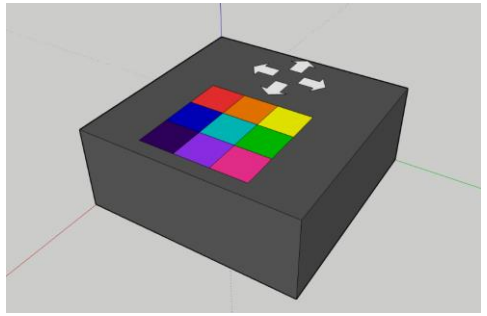
Piano model



Keypad 3D model

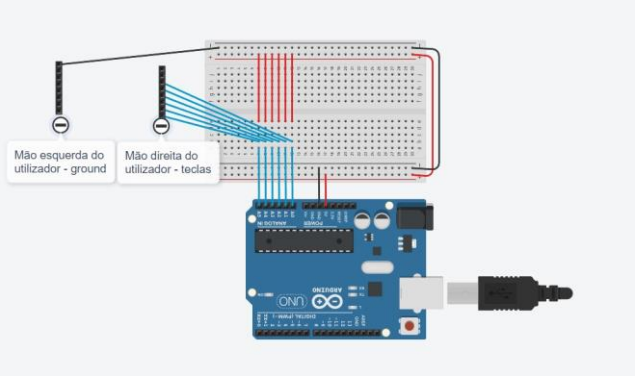


Logic gates 3D model

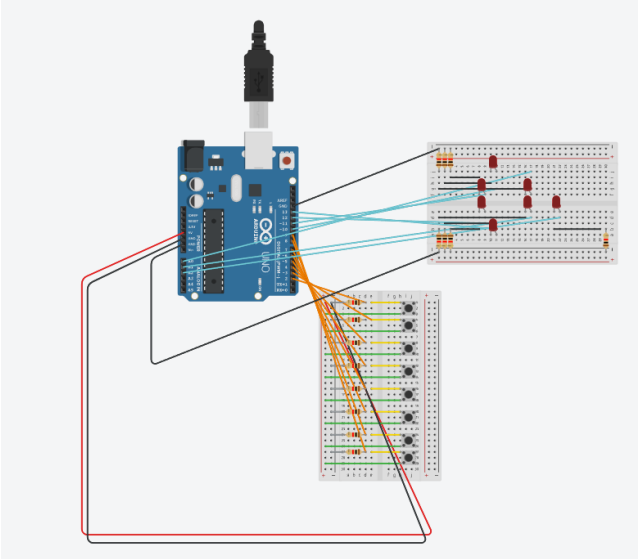


LEDs display 3D model

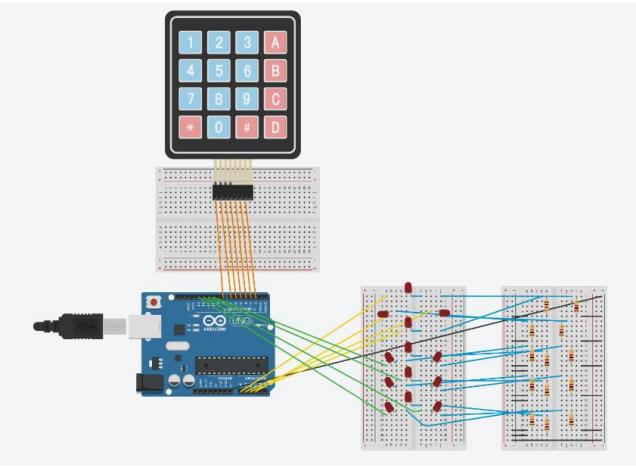
3D Prototypes



Piano puzzle



Logic gates puzzle



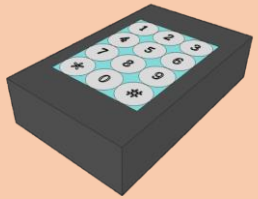
LEDs & Keypad puzzle

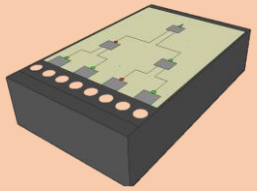
Electrical schematics

Flowchart of an escape room narrative

Elements:

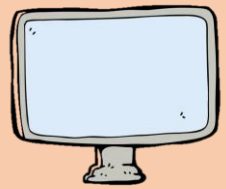

Piano puzzle


Keypad puzzle


Logic gate


Leds display


Radio


Screen

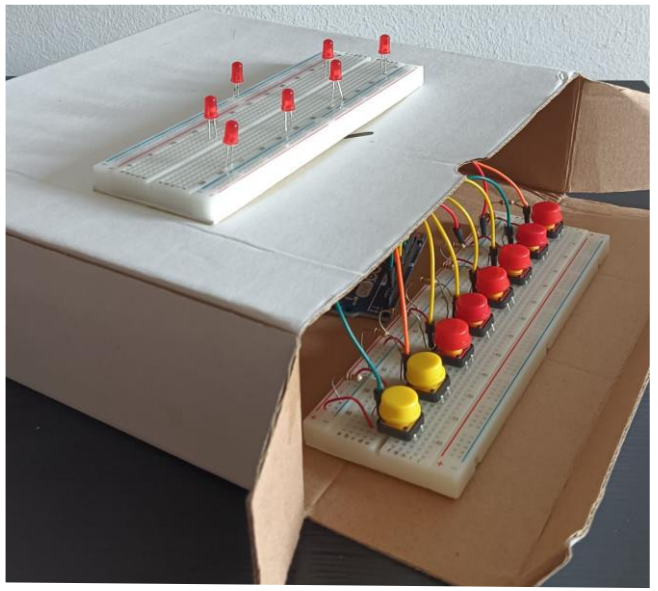
Enter the room → A sequence of LEDs will blink (1) → The player must click the respective position on keypad (Repeat 4x) → The 4 colours obtained should be associated to the colours of a resistance value (2) → The resistance value correspond to a radio frequency (3), which plays encoded audio on repeat (4) → This audio must be decoded and played on the piano → When correctly played give a location for clue (5) → The truth tables of logic gates will be on page 4 (6) (of an article, news, or book) → Solve and identify the logic gates by trial and error → The final interaction is still under development

Clues:

- Blink leds: (1) White, Orange, Blue, Green
  - → Resistence Value: 93MΩ (2) → Frequency Value: 93 MHz (3)
  - → Code number: 6 – 7 - 4 – 5 (development) (4)
- Hear a sound: (Li, La, Le, La, Lu) (5) → Play sound: “PAGE FOUR” (6) → Truth tables of logic gates will be on page 4 (7)

Piano puzzle

Logic gates puzzle



LEDs & Keypad puzzle

Hardware Prototypes

Challenges faced by the team

- At the beginning, we had some difficulties in understanding and defining the scope of the project;
- We had some problems expressing ourselves to the other members, that may have contributed to delays in defining the tasks to be accomplished, but as the project progressed, these issues were resolved;
- We encountered some barriers while building the prototypes, as we requested certain materials that were unavailable, leading us to utilize alternative materials. Consequently, we had to familiarize ourselves with the new materials;
- At some points of the project, we couldn't all be present at the same time, due to assignments in other disciplines;
- Regarding the design aspect, the shift in the direction of the games impacted how we designed them.

Deviations from original schedule

- We only completed some brainstorming ideas recently, as the final mini-games were established late in the process.
- The requested hardware took longer than we anticipated to arrive, and not all of it has met the requested specifications, requiring adjustments.
- We underestimated the difficulty we would have in creating a complete escape the room, with a story, clues, and dynamic interactions.
- Finding compatible schedules for everyone to meet as a team revealed as a challenge.
- Delays in achieving one objective led to delays in subsequent objectives.

Contribution of each team member (1)

Gil Jardim	Rafael Santos	Rodrigo Campos
Designer	**Team Leader**	**Marketing**
Brainstorm - Creation of interactions	Brainstorm - Creation of interactions	Brainstorm - Creation of interactions
Designing 3D projects	Make a list of the necessary materials	Blog writing
Sketching hardware connections	Managing resources	Preparing the presentations
Assisted other departments	Assisted other departments	Assisted other departments

Contribution of each team member (2)

Gonçalo Baião	Gonçalo Firme	Tiago Nóbrega
Software Developer	**Hardware Developer**	**Building**
Brainstorm - Creation of interactions	Brainstorm - Creation of interactions	Brainstorm - Creation of interactions
Web page development	Hardware connections prototyping	Building puzzle prototypes
AR Research	Software development (Programming Arduino)	Sketching hardware connections
Assisted other departments	Assisted other departments	Assisted other departments

New schedule

	April				May				June			
	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16	Week 17	Week 18	Week 19	Week 20
Individual Puzzle Prototype												
Component Interaction												
Individual Puzzle Design												
Material and Decoration												
Prototype Assembly												
Preliminary Tests												
Final Tests												
Prepare Evaluation Material