ElectroCap Project Proposal

Smart Sound Monitoring

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TÉCNICO LISBOA

1. Advisors and Mentor

- Scientific Advisor: Prof. Luis Caldas de Oliveira
- Scientific Co-advisor:
- Coordinator:
- Mentor: Rafael Cordeiro

2. Problem definition

Our primary aim in the Smart Sound Monitoring Project is to comprehensively map and analyze the sound quality and characteristics of a concert hall.

The goal is to provide a precise and valuable insight into the acoustic environment, identifying problems and potential improvements.

3. Solution beneficiaries

Every person that is exposed to sound in the context of a show/event will benefit from a better overall audio quality across the whole venue.

Moreover, sound technicians will be able to accurately monitor, in real-time, any place of the venue, without having to leave the control booth.

4. Technological solution

Our project consists, essentially, in a moving sensor that transmits data to a graphical user interface (which will be designed by us) in real-time.

The sensor must be able to capture audio information accurately even from a considerable distance to the sound source. By coupling it to a processing unit, we should manage to acquire decibel level readings. We would also like to work with information about the frequency response for the audible spectrum (at least).

The way the movement of the sensor will be accomplished will depend on the application.

5. Competitors and previous work

- Competitors: Ghent University.
- Previous work: their solution is based on static sensors.

6. Solution requirements

Our solution should be able to:

- Acquire sound information;
- Process the information;
- Transmit the processed information;
- Display it on the graphical user interface (in a map).

7. Technical challenges

- **Localization system**: Making sure the wireless modules provide accurate data and that this data corresponds to the correct location where it was collected.
- **Communication**: Having a reliable and robust communication system between the different modules.
- **Real-Time Data**: The sensors on the wireless modules must provide real-time data, allowing an instant analysis and response to changes of the sound.
- **Cost:** While working on this prototype, we have the goal of developing a product that could be affordable and easily commercialized and not something very expensive and "niche-oriented", keeping the cost at a low level without fully compromising the quality of the solution.
- **Privacy:** When it comes to collecting data in a public space, privacy issues will arise. We have to tackle this from the beginning.
- **Compatibility:** Developing a system that can be adapted to various situations and auxiliar technologies.

8. Partners

XLR Portugal – www.xlr.pt

9. Testing and validation metrics

We need to make sure that:

- The sensor is able to determine its position correctly;
- The sound data acquired is accurate (we must also guarantee consistency and coherence of the results);
- The latency between the reading and display of the information is low enough.

10. Division of labor (I)

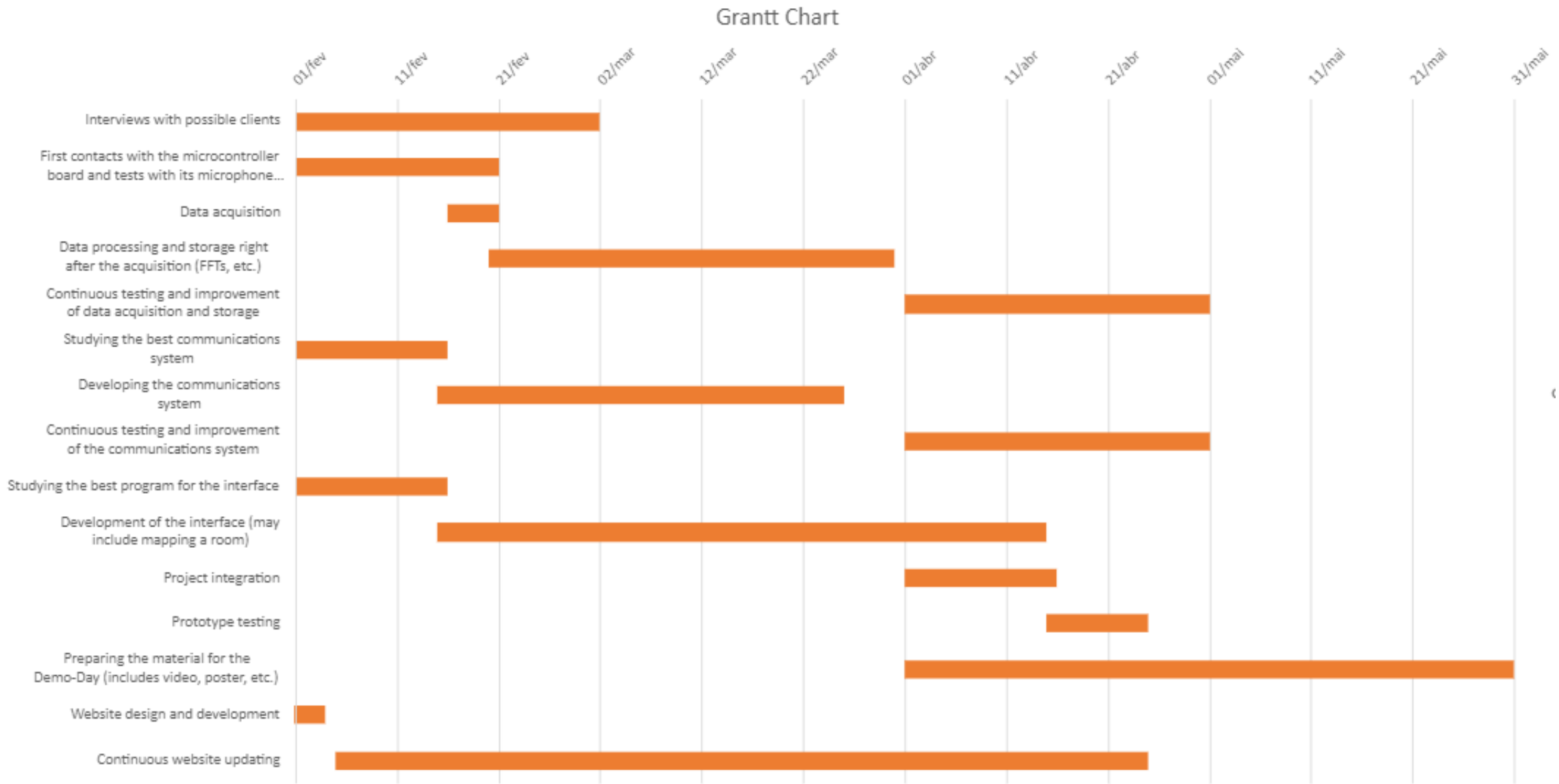
Afonso Cruz	Carlos Reis	Frederico Paula
Data Presentation	**Data Acquisition**	**Communications**
Website design	Regular Updates (Website)	Multimedia (video and poster)
		Prototype test

11. Division of labor (II)

Gonçalo Lázaro	Nuno Jorge	Pedro Martins
Data Acquisition	**Data Presentation**	**Communications**
Demo-day	Interviews with Clients	Project Integration
Localization	Data Storage	Team Management

12. Schedule

Task	Start Date	End Date
Interviews with possible clients	1/fev	2/mar
First contacts with the microcontroller board and tests with its microphone (includes comparing it with a professional sound meter)	1/fev	21/fev
Data acquisition	16/fev	21/fev
Data processing and storage right after the acquisition (FFTs, etc.)	20/fev	31/mar
Continuous testing and improvement of data acquisition and storage	1/abr	1/mai
Studying the best communications system	1/fev	16/fev
Developing the communications system	15/fev	26/mar
Continuous testing and improvement of the communications system	1/abr	1/mai
Studying the best program for the interface	1/fev	16/fev
Development of the interface (may include mapping a room)	15/fev	15/abr
Project integration	1/abr	16/abr
Prototype testing	15/abr	25/abr
Preparing the material for the Demo-Day (includes video, poster, etc.)	1/abr	31/mai
Website design and development	15/jan	4/fev
Continuous website updating	5/fev	25/abr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01/fev
11/fev
21/fev
02/mar
12/mar
22/mar
01/abr
11/abr
21/abr
01/mai
11/mai
21/mai
31/mai
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