Project Deliverable C: Design Requirements and Project Plan

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Abstract

In a professional engineering design, the test is a fundamental step because it allows us to see the solidity or the validity of a product. These results allow modifications to be made to produce a better version of the product. This is how this report fits in, which aims to establish a series of methods and strategies that will allow the testing of the equipment of a design. So, we will rely on these results in order to define the requirement specifications for the new product. This is where we will divide our work into three parts. In the first part, we will analyze which methods we will use to validate the quality of a product. The requirements of our product will be defined in the second part. Finally, we will develop a plan that will illustrate the steps to follow for the success of our project.

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Acronym	Definition
CFC	CallForCare

1 Introduction

In order to meet the expectations of our client Fran, who needs supports to communicate with a nurse at night, we analyzed different prototypes that she used in the past. The analysis of these prototypes can be done in two stages: the analysis of the hardware part and the analysis of the software part. In our analysis, we have carried out a test plan for the materials used. This is how this report will be divided into three main parts: In the first part we will develop a prototype test plan that will allow us to define the metrics. In the second part, we will show what our prototype will be different from those that already exist and in the last part we will develop a plan that will allow us to carry out our project.

2 Product Test Analysis

2.1 List of Metrics

In order to define the list of metrics, we first defined the elements that we will take into account during our tests. These elements will allow us to create our table of metrics. They are made up of three parts illustrated in figure 1: Brainstorm of testing

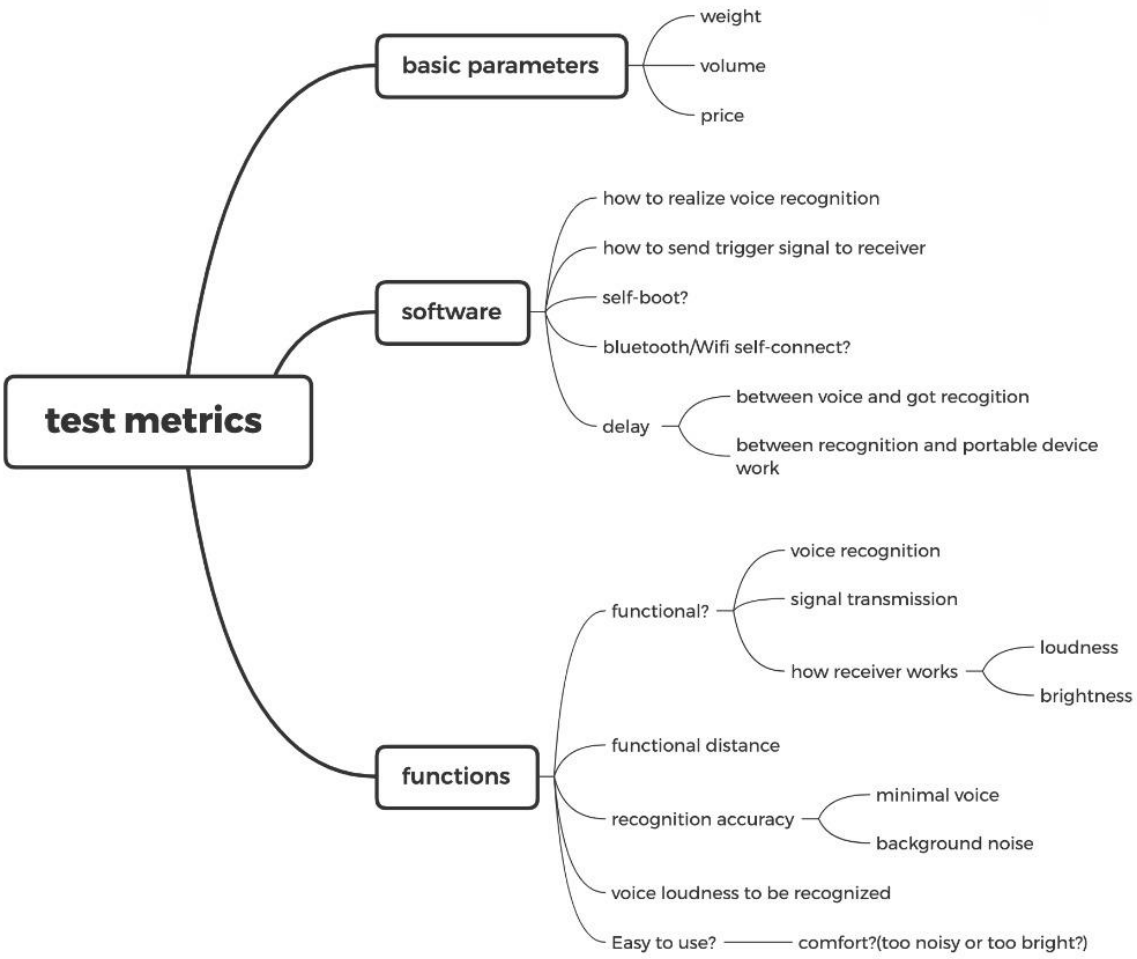


Figure1: Brainstorm of testing

The figure below allows us to fill in the table 1 below:

	Metrics	**Unit**
1	Total Cost	Cad
2	Weight of Receiver	g
3	Volume of Receiver	mm^3
4	Weight of Emiter	g
5	Volume of Emitter	mm^3
6	Weight of Main Device	g
7	Volume of Main Device	mm^3
8	Power Sources	V, A
9	Alarm Duration	s
10	Alarming Noise Loudness	dB
11	Alarming Light Brightness	lm

Table1: Metrics table

3 Hardware and Software Testing

Due to the fact that we haven't received the prototypes from Markerlab, we have to test the existing design by reading their user manuals. Thus, our team carefully studied the codes of the two groups and analyzed their design ideas. We decided to test the products from NicaBell team and CallForCare team because they both decide to utilize raspberry pi as their development board which is just the same as our idea.

3.1 Nicabell

From the code of NicaBell team we could see their central idea is to build a local area network communication server and client through socket method. This approach has a prominent advantage: as long as the Wi-Fi can cover it, two devices connected to the same Wi-Fi can communicate with each other. This makes the long-distance transmission of the signal possible. At the same time, it also reduces the dependence on signal strength to some extent. However, this method requires high quality of network connection.

The basic working principle of the whole program is also very simple when the process is relatively complex and the code is lengthy.

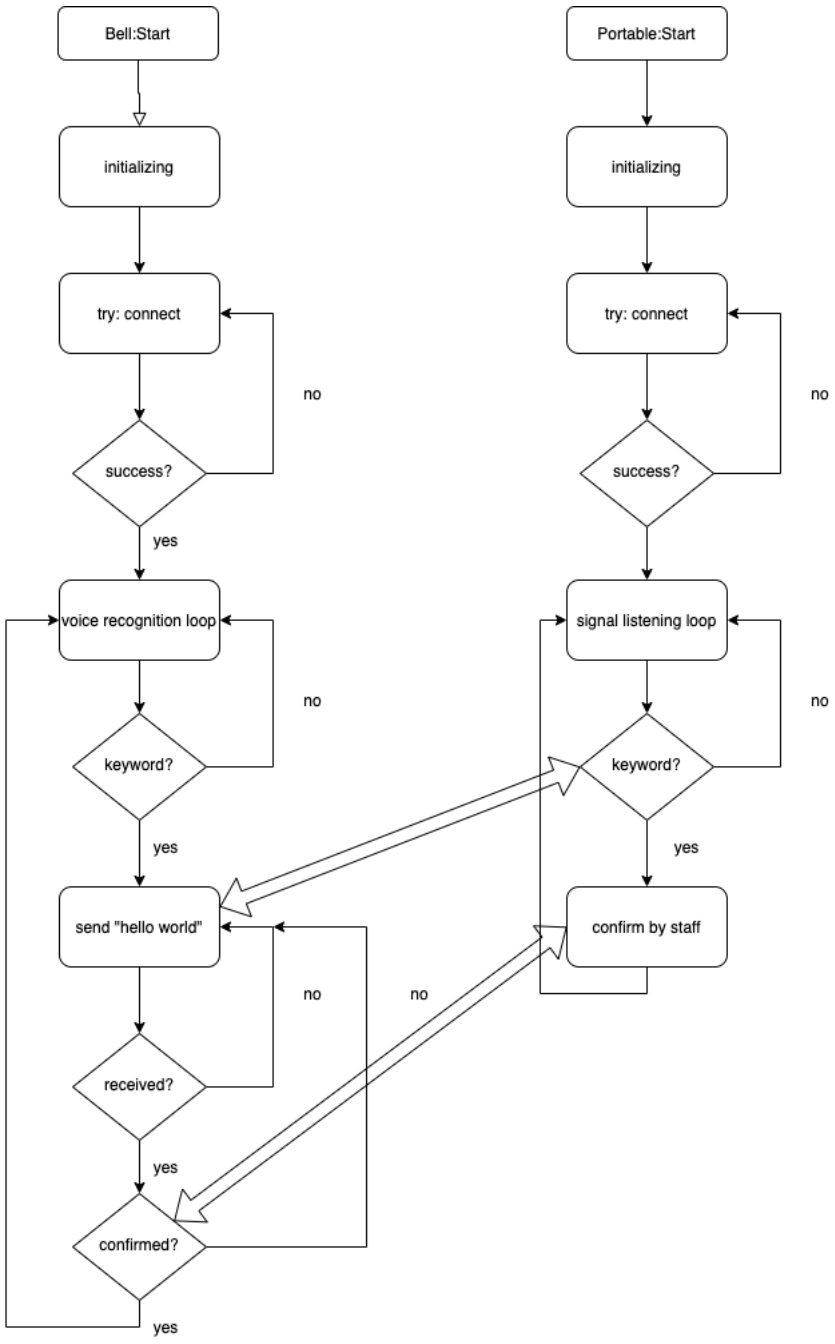


Figure: NicaBell's algorithm

The speech recognition function of the main device is realized by using the local original code. This advantage is that there is no need to connect to the network, so it avoids the identification delay or even difficulty caused by the poor quality of network connection. You know, our

products are designed to save lives. Thus, a small mistake will have great consequences. Therefore, stability is a very important factor in this product design.

In the second half of the program, they add the confirmation of the signal and the feedback mechanism when the caregiver presses the button. We think it's very good. First of all, it can ensure that the trigger signal is sent to the portable device accurately. Secondly, through the feedback mechanism that the caregiver presses the button, the elderly who encounter difficulties can also know that their call for help has been successful and there is no need to call for help again and again. This can save their physical strength and make him / her feel at ease at the same time. I think we will add corresponding functions to our products.

3.2 CallForCare

In the code of CFC product, they decide to use Bluetooth as connection bridge between the bell and receiver. This coincides with our thinking. Because the customer clearly put forward in the demand, because the network connection of the residence is not that good, so they hope that the product can be used even without the network.

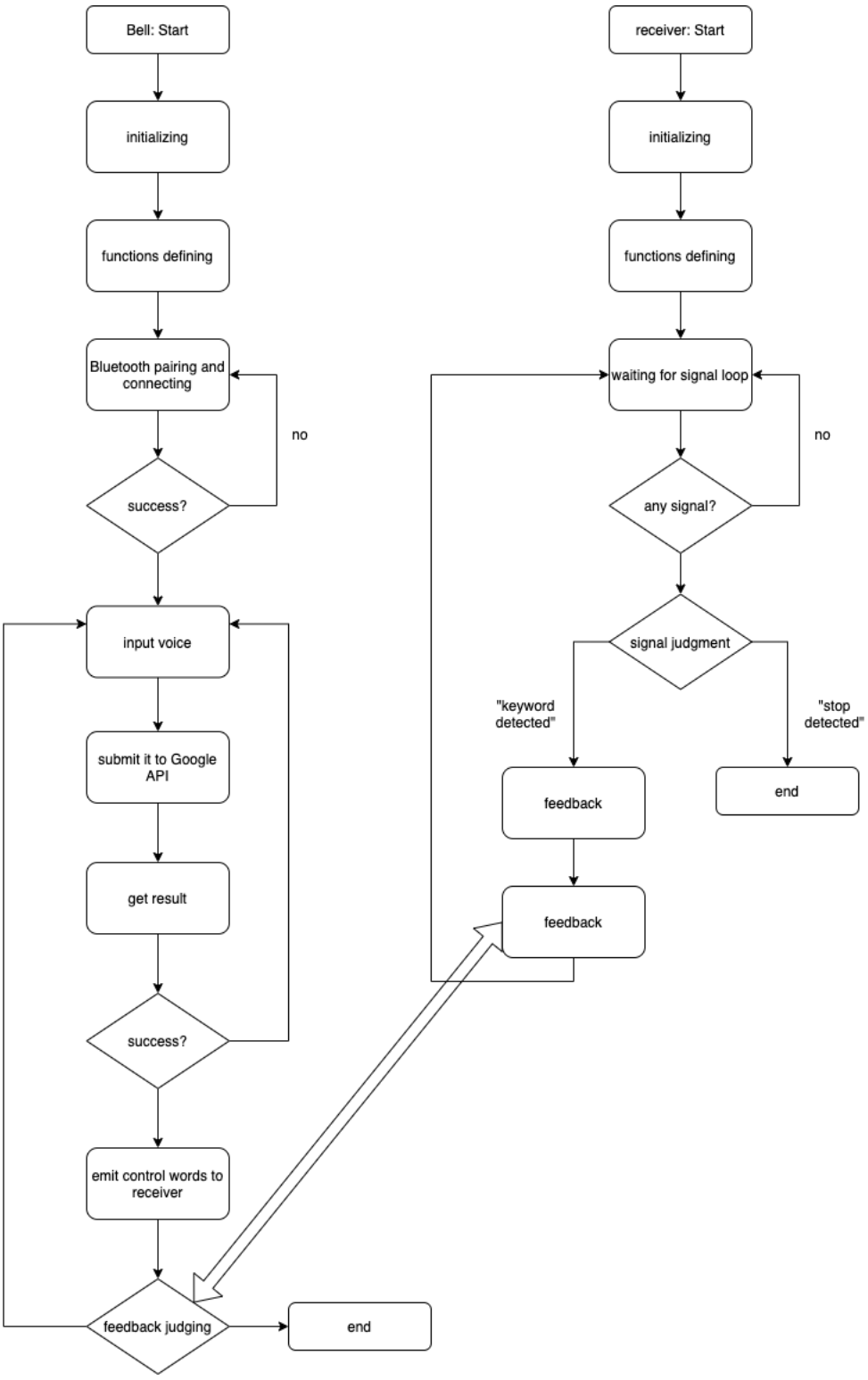


Figure2: CallForCare's algorithm

We can see that CFC team chose the Bluetooth connection, and they explained that this connection is stable and efficient and can be connected automatically on the boot, without considering the network factor. But when they implement voice recognition, they call Google's API, which itself involves uploading local recording files to Google's server and receiving them back after the analysis is complete. If the quality of the network connection is poor, the speech recognition function will be affected or even unable to use.

Therefore, our team expects to combine the advantages of the above two, using a completely local connection, which means local speech recognition and data transmission based on a Bluetooth connection.

4 Prototype requirements and problem statement

For this part we used the one we had in deliverable B with a slight modification due to the analysis of the code from the user manual and the feedback from the last submission. Our team will fully complete this part after receiving the prototypes.

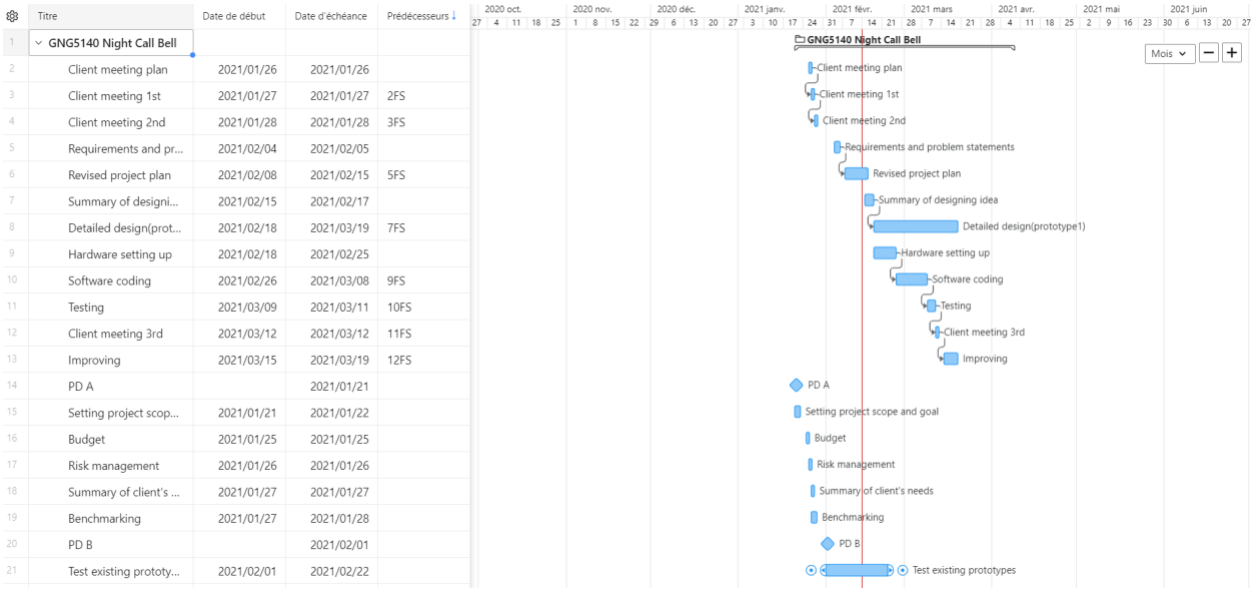
Needs	Priority
The device can quickly identify the voice of our client.	1
The device's ability to recognize sound will not be affected by background noise.	1
The device can quickly send alarm information to the staff.	1
The devise is easy to use by the staff	1
It is best that the device can run without a network.	1
The operating device does not need to be borrowed through other devices such as mobile phones and computers.	1
The size of the transmitter is suitable for fixing on the table, and the size of the receiver is suitable for keeping in the pocket.	2
The device uses fixed power sources and sockets to provide power.	2
The receiving end is prompted by optical signal and sound signal, and the transmitting end only uses optical signal.	2
The device has a good plastic package, preferably waterproof.	3

Table2: Requirements

Problem statement: "*Our client needs an easy-to-operate night bell that can be controlled by voice and could send a wireless signal to the caregiver when she needs help*"

5 Revies Project Plan

In the figure below we have estimated the time needed to complete the project on time.



	Titre	Date de début	Date d'échéance	Prédécesseurs
1	GNG5140 Night Call Bell			
2	Client meeting plan	2021/01/26	2021/01/26	
3	Client meeting 1st	2021/01/27	2021/01/27	2FS
4	Client meeting 2nd	2021/01/28	2021/01/28	3FS
5	Requirements and pr...	2021/02/04	2021/02/05	
6	Revised project plan	2021/02/08	2021/02/15	5FS
7	Summary of designi...	2021/02/15	2021/02/17	
8	Detailed design(prot...	2021/02/18	2021/03/19	7FS
9	Hardware setting up	2021/02/18	2021/02/25	
10	Software coding	2021/02/26	2021/03/08	9FS
11	Testing	2021/03/09	2021/03/11	10FS
12	Client meeting 3rd	2021/03/12	2021/03/12	11FS
13	Improving	2021/03/15	2021/03/19	12FS
14	PD A		2021/01/21	
15	Setting project scop...	2021/01/21	2021/01/22	
16	Budget	2021/01/25	2021/01/25	
17	Risk management	2021/01/26	2021/01/26	
18	Summary of client's ...	2021/01/27	2021/01/27	
19	Benchmarking	2021/01/27	2021/01/28	
20	PD B		2021/02/01	
21	Test existing prototy...	2021/02/01	2021/02/22	

Figure4: Gantt Chart

6 Conclusions and Recommendations for Future Work

In this report, we have highlighted the software analysis of the performance of two existing projects. This analysis allowed us to see certain flaws in each project. So, our challenge will be to solve these problems in our design. To do this our team decided to use a local server and not the internet. Indeed, the connection will be weaker with the latter. Therefore, this will allow the transmitter and the receiver to communicate over a greater distance. In addition, we have in the report defines how to test the hardware part of already existing projects. However, we were not able to have the prototypes in time to test them. And, the analysis of the software part is not sufficient to determine the revised design requirements. We will update that part when we will receive the prototypes. Ultimately, we have created a plan that will allow us to complete the project until the design day.

7 Bibliography

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