

I'm Gabriele, a UX Researcher based in Berlin with a background in Sociology and Digital Communication



◆ UX projects index



Smart Bow

A multi-sensory interactive tool designed to help both beginner and advanced cello players in training one of the most difficult tasks when playing cello: the bow usage.

I developed a physical prototype by using sensors (microphones, IMUs) to capture information about the real-time position of the bow.

Then, I exploited the user's vision and touch sensory modalities by providing both haptic and visual feedbacks. These feedbacks nudge the user to correct the bow position.

Page 3 - 5



Nest 360

A prototype of an intelligent cradle, designed and delivered in just 4 hours during the Co-creation Hackathon, organized by HIT Foundation and Trentino Sviluppo, as part of the European "iProduce" project.

Although this case-study is less articulated than others, I decided to include it in this portfolio because it shows how I work under high time-pressure situations.

The final project was delivered through multiple prototyping tools: a 3D model of the cradle, a prototype of its digital interface and an Arduino based mechanism.

Page 6 - 8



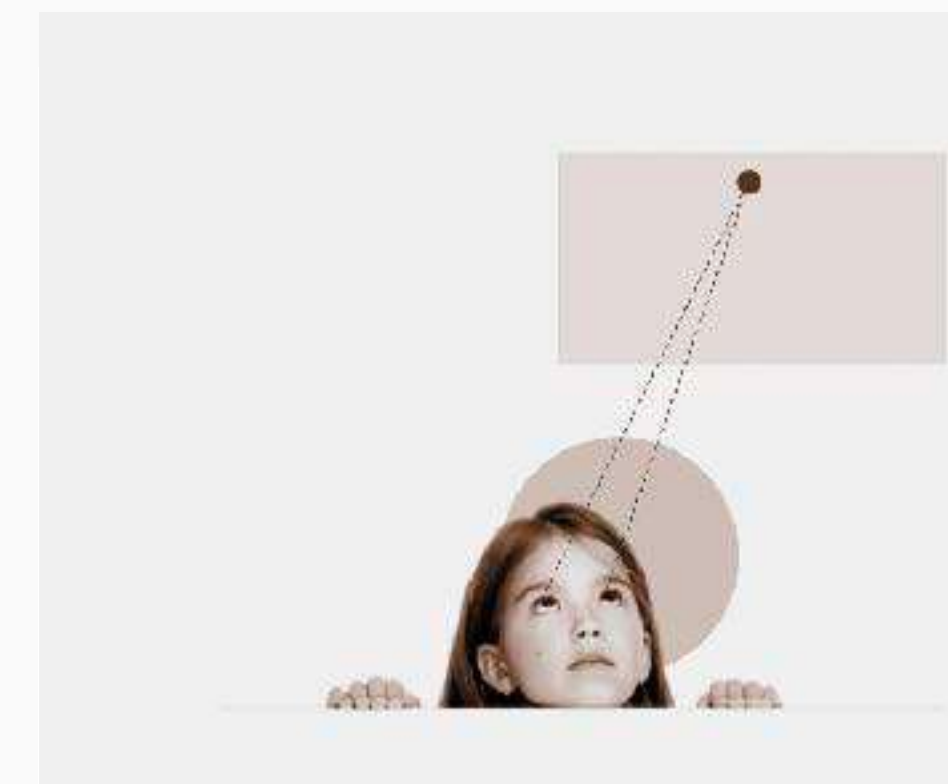
Online vs in-presence lectures

A qualitative UX research on students' learning experience during COVID-19 pandemic. It was conducted adopting semi-structured interviews, focus-groups and ethnographic observations.

Managing a whole qualitative research process can be very tough and time-consuming, especially when users are involved in activities such as participatory design workshops.

This experience helped me in gaining some fundamental skills in extracting useful insights from first-person qualitatively collected data.

Page 9 - 11



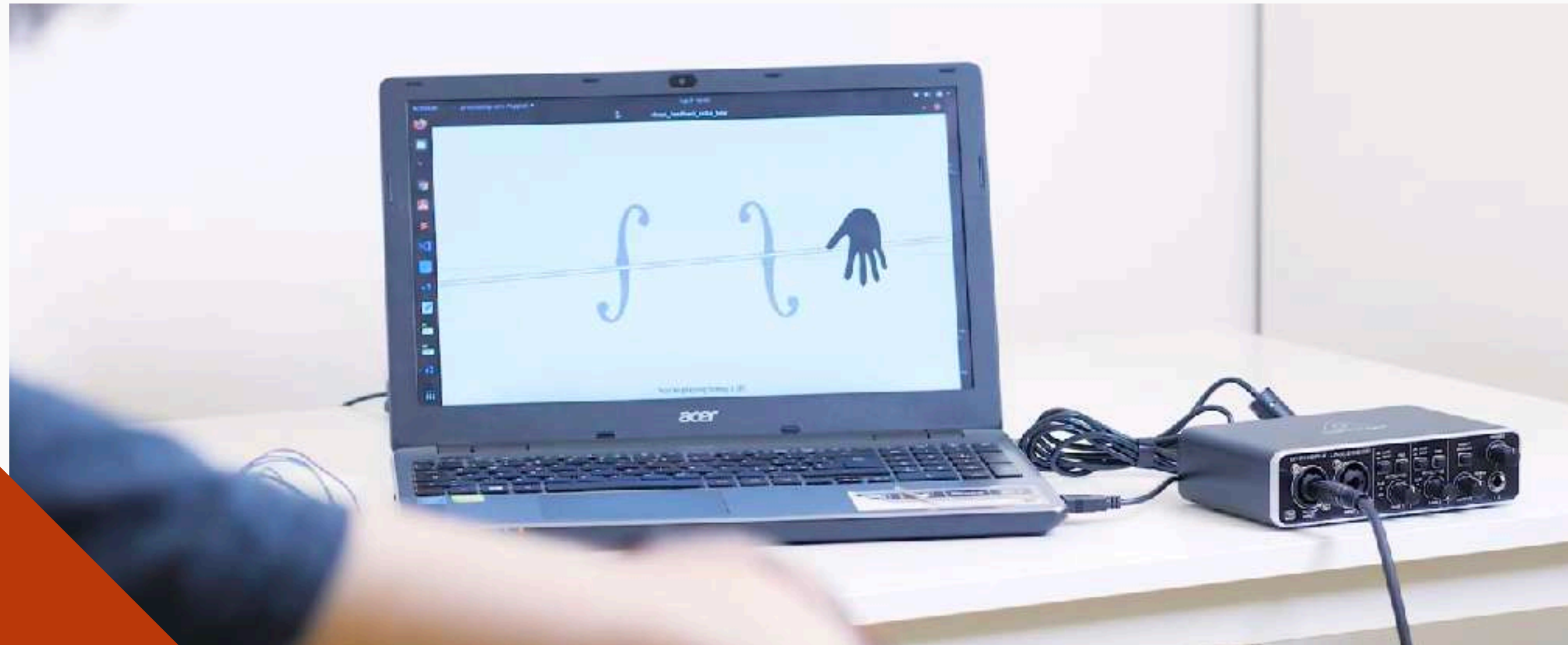
Crab

An educational app meant to assess learning capabilities through playful interactions in 8-10 y.o. children.

In developing this project, I faced 2 main challenges: first, creating an engaging storytelling throughout the game, second, making an effective tutorial which could be easily understandable by a child.

Gamification is a fundamental aspect of UX design. Through this project, I learned how it can be exploited in the educational technology field.

Page 12 - 14



Smart Bow

Project overview

Problems

Beginner cello students struggle with keeping the bow perpendicular to the strings. In addition, their auditory and visual sensory modalities are overwhelmed by stimuli. How could we help them in managing this difficult task?

Methods

Factorial design experiment;
user testing;
quantitative research.

Tools

Arduino;
Teensy;
Processing;
Puredata.

Goals

Exploit cellists' haptic sensory modality to convey useful feedbacks about their bowing, thus helping them at improving it.

Developed in collaboration with Stefano Businaro and Maria Vitali (2022).



Cello is a bow string music instrument of the violins' family. As all strings, it requires a high level of accuracy to be played and many years of studying. One of the major requisites for correctly playing it is keeping the bow perpendicular to the strings.

Especially for beginners, accomplishing this task is extremely difficult because, from the cello player perspective (while playing), it is hard to understand if it is being done correctly. This skill which requires a lot of time and practice to be acquired, up to the point in which the player gets used to it.

Traditionally, this skill is taught by the teachers which warn the students when they are playing the cello with the bow in a crooked position, and correct their posture while playing, moving their arm accordingly. Consequently, students practicing Cello on their own, at the beginning, are constrained to play the instrument in front of a mirror to see if their movements are right. Thus, to train with the Cello, students would also need a proper place with enough space in front of the mirror at home, which is not always possible.

In addition, properly learning the correct movement in front of the mirror is not that obvious because of specularity.

Therefore, the use of the bow is the first and biggest obstacle that beginners bump into when approaching the cello, which, of course, is also the prerequisite to start playing the cello correctly.

Thus, keeping the bow perpendicular to the strings is not an easy task for students.

Users' pain point

Gabriele Cazzola, University of Trento, May 2023.

Design process

1 Literature review

2 Prototype

3 Pre-test

4 Experiment

In order to address this problem, a multisensory interactive system might be the proper solution.

SmartBow provides stimulation through 2 main sensory modalities:

A visual interface shows the inclination of the bow;
Two vibration motors placed in the forearm interact with the user.

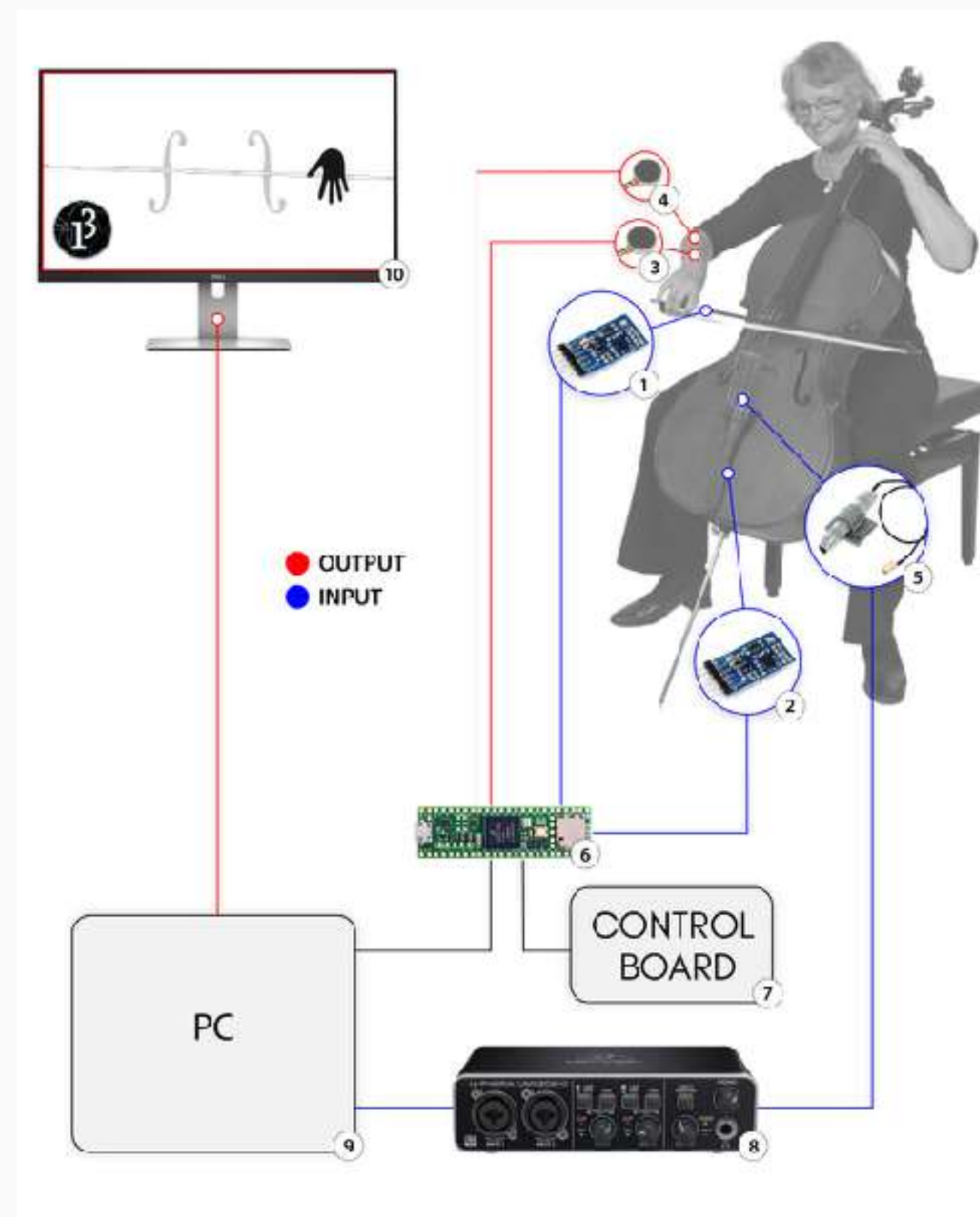
In this way, SmartBow gives students feedback on how they are handling the bow with respect to the strings, helping them correct their movements. In fact, Smart Bow leverages visual and haptic perception to allow cello students to practice on their own in an effective and intuitive way.

Developing such a system is a delicate task, since SmartBow operates in a context of sensorial saturation: playing a musical instrument is a complex task, which already involves many senses at the same time. Thus, after an initial analysis of the problem, the implementation of an auditory feedback has been excluded, to avoid a situation of conflict between the feedback itself and the sound emitted by the cello.

SmartBow takes as main input the body movements with respect to the cello, exploiting IMU's gyroscope ability to detect absolute orientation in space. A microphone on the cello also provides auditory input, in order to correctly detect the string which is being played. As previously mentioned, the outputs are a visual animation of the position of the bow with respect to the strings, and a vibrotactile stimulation given by the vibration motors.

Once the SmartBow prototype was assembled and after a pilot study was conducted, an experimental step was organized to test the system.

Our research question was to understand if participants' interaction with the SmartBow system actually influences body motion-response and body-perception, improving the user's ability to keep the bow perpendicular to the strings.



In order to assess the hypothesis, we performed an experiment with the intended users. Unfortunately, due to the COVID pandemic and its consequences, it has not been possible to engage actual cello students in the experimentation. However, the testing has been conducted anyway, inviting a sample of 10 young people (100% under 27 years old).

User research

We structured a within-subjects study design divided in 4 main steps. At the start of the experiment, participants had to fill a survey asking them general questions to assess the participants' impression and familiarity with the cello.

Second, participants were asked to try the cello to get familiarity with the instrument and fill the second part of the survey. Third, they had again to play the cello but with the visual interface of SmartBow activated and, after that, fill the corresponding part of the survey. Last, participants had to play the cello with both the visual and the haptic feedback implemented, and, again, fill the survey.

The survey was divided into 5 sections. The purpose was to evaluate if participants felt more comfortable with SmartBow's functionalities being activated or not, asking them the same implicit questions after each step of the experiment. In addition, each section of the survey had a couple of explicit questions about SmartBow's functionalities. This structure would allow us to both get insights about the explicit perception of participants towards SmartBow, and also to compare how they felt during each stage of the experiment.

Furthermore, during each performed task, the number of errors made by the user was counted by the system,

providing us with some quantitative data.

We had the chance to perform the experiment with 10 volunteers. Within our sample, 44% of the respondents had never played any string instrument, the remaining had tried or played one, e.g. one participant has been playing violin for 12 years, others play the guitar.

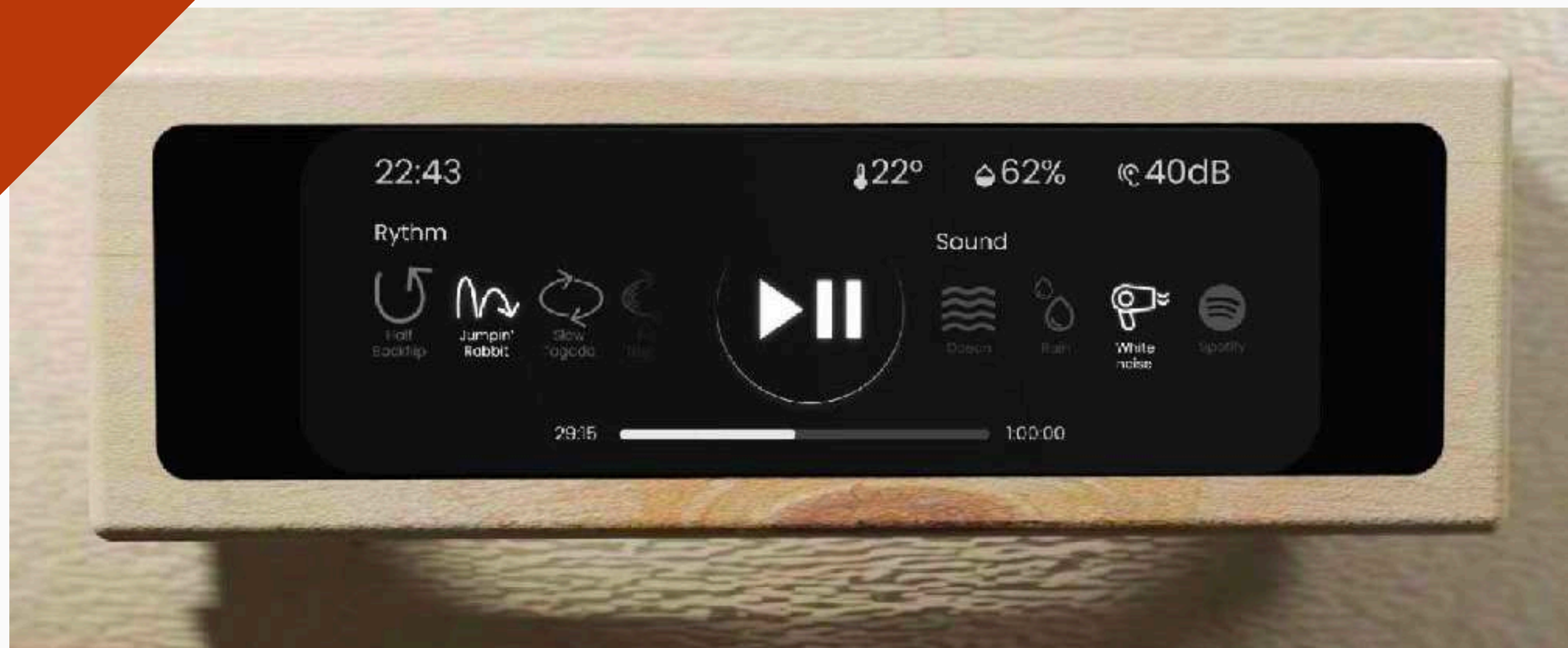
Anyways, almost all of the participants stated their low familiarity with the cello and consider it as a difficult instrument to play.

My role in Smart Bow

The idea of this project was born from my personal experience. When I was a cello student, especially at the beginning, I was really struggling with keeping my bow in the correct position.

Specifically for this project, I focused on developing the UI (which provides visual feedback about the bow orientation) and on the implementation of the physical prototype.





Nest 360

Project overview

Problems

What will cradles look like 10 years from now? The challenge consists in providing an initial answer to this question, proposing innovative ideas in a very short amount of time.

Methods

Rapid prototyping;
design thinking;
double diamond.

Tools

Blender;
Adobe Premiere Pro;
Figma;
Arduino.

Goals

Designing (in just four hours) an hi-tech cradle, according to the principles of co-design, co-development and open innovation.

Developed in collaboration with Riccardo Carretta, Luca Cazzola, Fabio Fiori (2022).

What will cradles look like 10 years from now? This challenge was proposed by iProduce (the promoter of the hackathon), which is a European Open Innovation project involving around twenty partners from nine different countries, including Italy.

The goal of iProduce is to develop a platform that brings together supply and demand, i.e. one that allows invention, realization and request of innovative products and services, tailored on companies needs.

We started the challenge by looking at available scientific information on the topic. We found that neurodevelopmental research suggests some principles which should be taken into account in the design of a cradle. They include:

- Proximity to parents;
- correct alternation of light and darkness;
- adjustable cradle swinging rhythm;
- regulated temperature;
- presence of gentle background sounds;
- reassuring lights;
- presence of interactive games (cause-effect).

We decided to embed in our project most of these aspects because they contribute to the overall wellbeing of the infant.

Our design proposal is based on scientifically backed guidelines about infants' wellbeing. We presented our solution through a 3D model of the cradle, a prototype of its digital interface and an Arduino based mechanism.

The wooden enclosure of the cradle is designed to be

Design process

- 1

Research on the topic, brainstorming (discover)
- 2

Selecting useful insights and ideas (define)
- 3

Prototyping (develop)
- 4

Final presentation (deliver)

removable in order to allow the parent to handle the child more easily inside it.

The cradle can be separated from the support structure to facilitate transportation and proximity to the parent.

The parents, through a specifically designed application connected to the cradle and the display on the structure itself, can always be able to monitor the quality of their child's sleep. They can select the sway rhythm, sounds, and timer for movement period.

A special blanket can be attached to the mattress in order to prevent the child from being in a prone position. Another important feature is the possibility to receive a notification on the phone whenever a sudden reaction of the child is detected (crying, tugging, etc). An immediate shutdown button is presented both in the application and on the display.

The kit should also include some games, designed and selected specifically for the well-being of the child. They can be attached to a modular holder on the fence.

We also imagined, in a future alternative of our prototype, that the cradle could be implemented with a system that favors the alternation between light and dark, in such a way as to guarantee the normal development of the child's circadian cycle.

Double diamond approach



My contribution in Nest 360

In this project, I designed the 3D model of the cradle using Blender. Initially, this model was intended as a prototype for reflection, because it helped the team to objectively discuss (during the design process) on the envisioned solution. Eventually, it was also useful for describing our ideas to external people (especially judges).

In addition, I adopted Adobe Premiere Pro for editing and exporting the final videos of the prototype, which were particularly appreciated by the judges during the final presentation.





Online vs in-presence lectures

Project overview

Problems

Students' learning experience seems to be badly affected by some learning modalities (especially during online lectures). How can we better understand these problems? In order to provide new possible solution, we need to build a grounded theory.

Methods

Qualitative research;
semi-structured interviews;
focus groups;
ethnographic observations;
personas;
workshops.

Tools

Audio recording;
Figma;
Cards;
Illustrator.

Goals

Better understanding which are the key hallmarks that underly successful lectures, both in presence and online.

Developed in collaboration with Delaram Esfahani, Elena Mauri, Ignacio Aristondo, Laura Biondo, Miraxh Tereziu (2021).

The aim of our research is to draw a comparison between online and in-presence learning, in an attempt to understand what makes a lecture successful.

From march 2020, each student experienced the transition from in-presence lectures to online classes: in a week, every matter related to university changed, and with it our way to experience it and our habits. We had to learn how to use online platforms for lectures (Zoom, Meet, etc.), to perform exams in front of a computer and to meet our colleagues mainly online. Now, almost 2 years afterwards, everything went back to how it used to be and is therefore the perfect time to understand what impact the change we experimented had on students, on their mental health and on their performance. While investigating these topics we focused our attention on the drawbacks and potentialities of the two learning modalities, on students experiences and on their opinions.

The topic we chose is one we were particularly interested in: as students, after disclosing our experiences and confronting them we saw that they were similar, that we suffered the same deficits, and in the attempt of making sense to what happened to us we decided to investigate the subject and deepen our understanding of the phenomenon.

We based our work on 3 different qualitative methods:

- 1) Observations (both virtual and in-presence);
- 2) Interviews;
- 3) Focus group.

We made 30 observations in total, five per each member of the group. Two of those five observations

Gabriele Cazzola, University of Trento, May 2023.

Research process

1

Framing the research questions

2

Fieldnotes, interviews, focus group

3

Design workshop

4

Qualitative coding

were taken into place in presence and the other 3 were online.

For the in-presence observations we have observed both students and teachers. The observations were carried out during classes in Povo, Rovereto and Trento. The goal of these observations was to see students and teachers behavior, distractions, interactions, attitudes, and the environment that surrounded them.

With the online observations we analyzed forums, comments and posts (reddit, skuola.net, twitter, quora, facebook) and had instead the possibility to gain an understanding of students' opinions, thoughts, feelings, personal experiences and insights mainly regarding online lectures and exams.

We conducted 12 interviews in total, both in presence and online, of students with experience of physical and online learning.

Our interview guideline touched all the topics of interest, namely:

Psychological factors,
Socialization,
Self management,
Tech issue,
Distractions,
Lecture hallmarks,
Student performances.

Themes we obtained from an initial coding

For our focus group we contacted people through the Instagram page @spottedunitn and included our personal contacts.

Qualitative research methods

Participants were, again, students with experience with on site and remote learning. The guideline was designed to address the problem from a different perspective: we asked the participants to draw a comparison between online and in-presence learning, we dived into the issue of mental health and delved into their personal experiences, thoughts and feelings.

Among the different variables that we took into consideration while structuring our research, the majority of them emerged only in the first phases of the process and we therefore decided to focus on the 3 factors that remained central throughout the whole study.

What we found was in line with studies conducted worldwide (Arora et al., 2020; Elmer et al., 2020;



Gabriele Cazzola, University of Trento, May 2023.

Adnan et al., 2020;). These studies showed that online lectures, compared to in-presence lectures, seem to negatively affect mainly 3 factors:

- 1) psychological factors;
- 2) self management;
- 3) social interaction.

Workshop with final users

The last part of our research activity employed a design workshop. We agreed that the goal of the workshop was to find new ideas to improve the learning experience of students, addressing the issues that came up in the previous stages, namely psychological factors, social interaction, and self-management.

We built our workshop on the aim of preparing the perfect lesson so each activity constituted a step of the process to get to the aim.

Our participants divided spontaneously into groups by sitting down at each table: we had 3 groups, 2 made of 4 participants and a group made of 3. The workshop lasted 1 hour and a half in total.

We distributed the personas and scenarios (previously created) right after the first ice-breaking activity along with posters, post its and all the necessary material to perform the tasks required. For each activity, a maximum time of 10 minutes was provided.

In the end, each group had 5 minutes to review their ideas and decide the best ideas for each step. At the end of the 5 minutes they had to present their work as well as the process that got them to that result.

User's artifacts

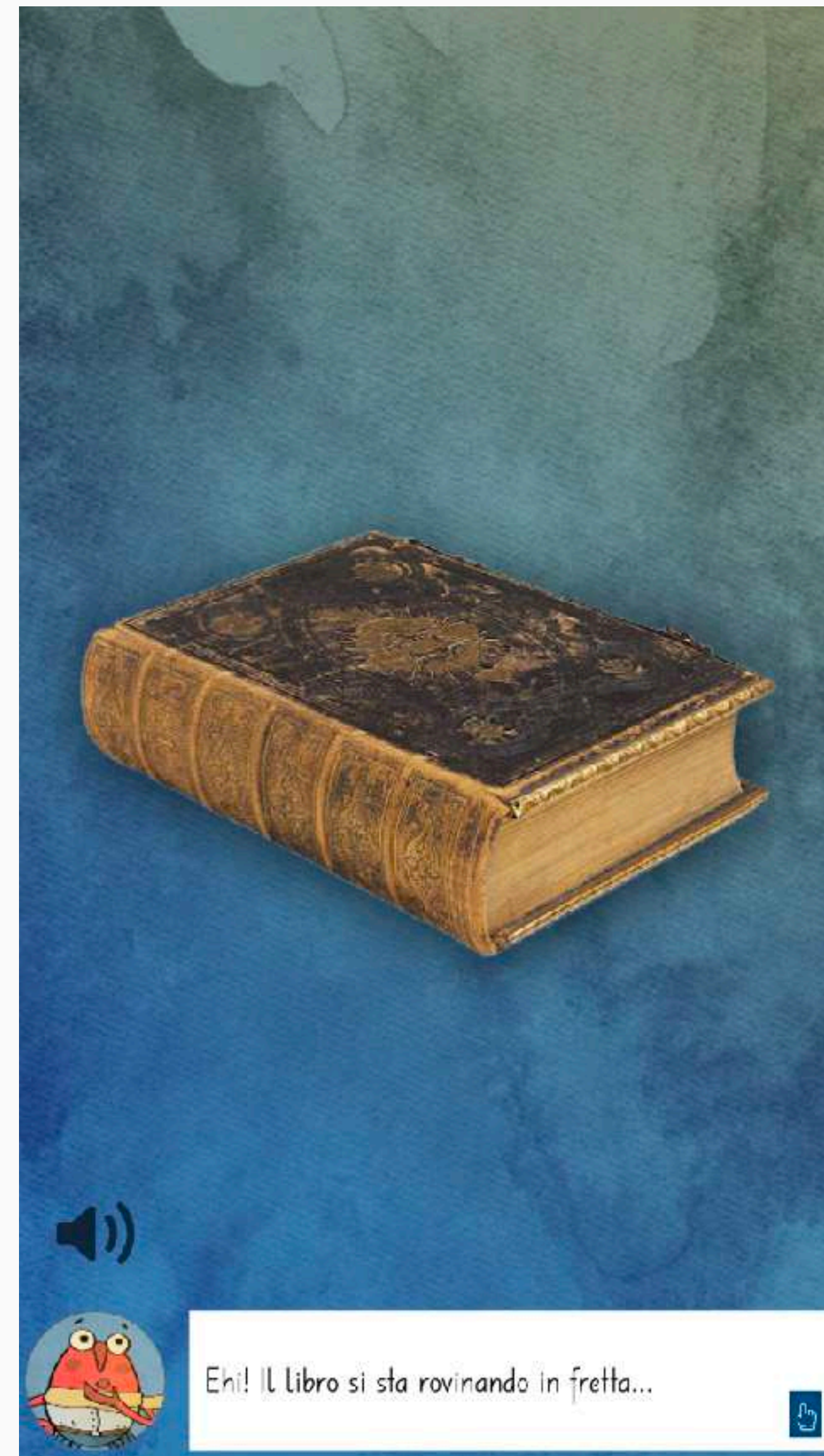
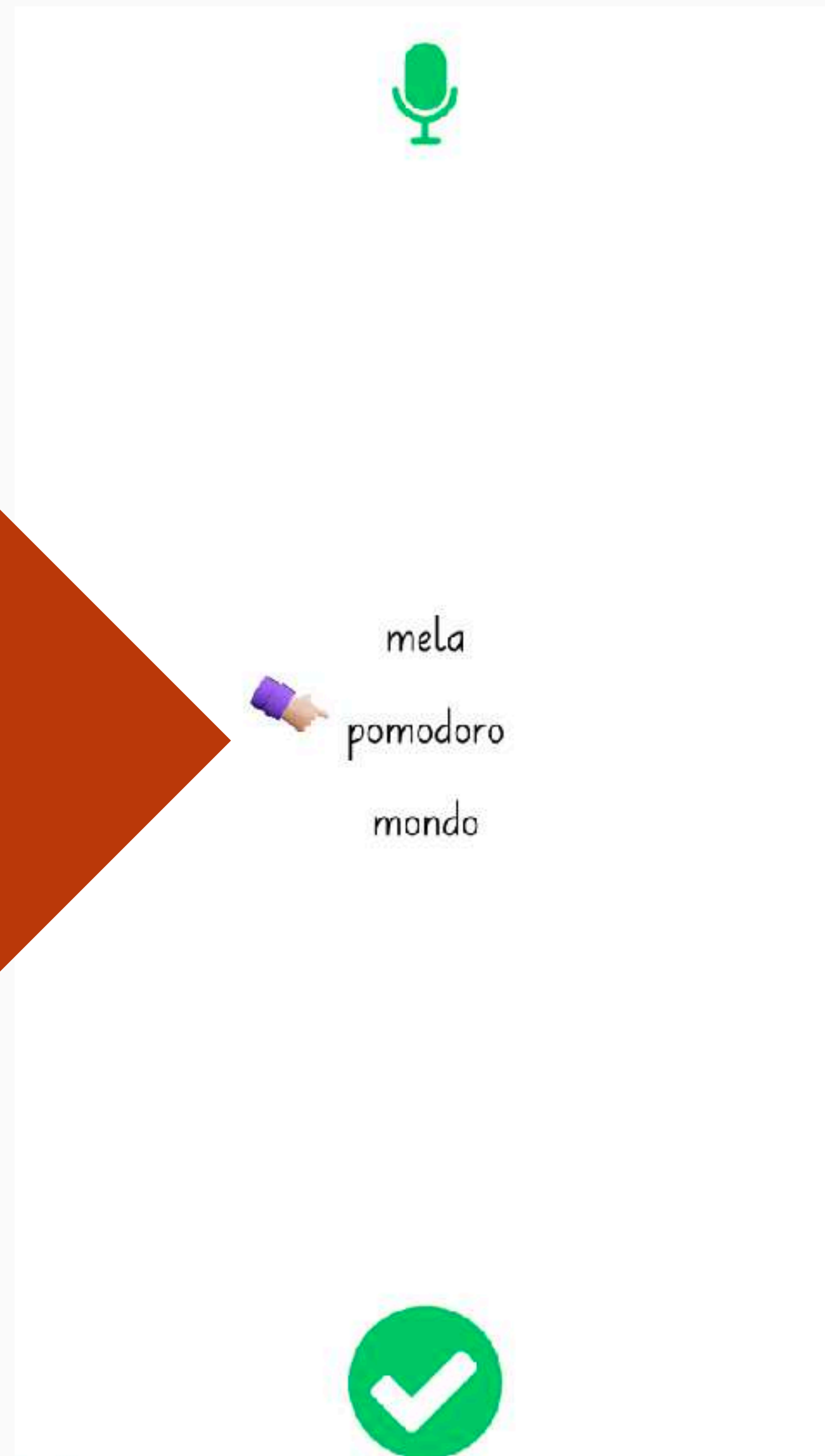


My role in this qualitative research

In this particular project, my background in Sociology became very handy. Indeed, I was able to help my teammates in framing the research question and structuring the interview guidelines.

Getting useful insights from qualitative data is always a challenging task, but eventually I was able to plan interviews, managing participants and moderating the focus group in an effective way.





Crab

Project overview

Problems

Students' reading capabilities are usually assessed through paper-based protocols. These processes require the presence of an experimenter and they're boring (for the child). In addition, a manual transcription of the results is needed. How could we improve this assessment methodology?

Methods

Wireframes;
design system;
prototype.

Tools

Figma;
After Effects.

Goals

Designing a high fidelity prototype of an application concerning gamified assessment of children's reading capabilities.

Developed in collaboration with Martina De Cet, Luca Santoro and Nicolò Veronese (2021).

Crab is a mobile application prototype designed for children. The aim of this prototype is to explore a potential gamified version of traditional assessments for learning abilities.

In particular, the protocol concerns in words and pseudo-words decoding in children. The interaction is structured in such a way that the desired target group can participate in and enjoy the assessment thanks to a gamificational approach.

The solution was designed for Italian speakers and the prototype is completely in Italian.

Performing experimental tests with children is not an easy task, neither for the experimenter nor for the subject. Indeed, the main challenge of this project was to deliver different kinds of learning assessments in a funny and enjoyable way for children.

In these cases, the main risk is to produce a so-called "chocolate broccoli", namely a traditional (boring) educational test covered by just some sweet gamification properties.

To avoid this, we adopted a sea-themed storytelling to convey specific messages that could actually improve the enjoyability of the whole experiment.

The whole game is set on a under-sea world, in which the protagonist (a crab) has to overcome many challenges in order to reach a treasure.

Design process

1

Literature review

2

Prototype

3

Tutorial definition

The experiment is divided into multiple steps.

Every time the child is asked to perform a new task (e.g. reading aloud), a tutorial session is provided. Every tutorial consists of an example of the actual task, which is firstly performed by the computer and secondly performed by the child.

The final task is composed of different sets of stimuli which consist of lists of Italian words and pseudo-words administered to the subjects via a tablet.

Every task is recorded by the system, which saves:

- 1) reading time;
- 2) reading accuracy (if pronounced words correspond to the presented ones).

Theoretically, the whole experiment runs while a real-time voice recognition system (RVR) actively monitoring the subjects' performance is in place, which is not present in this prototype.

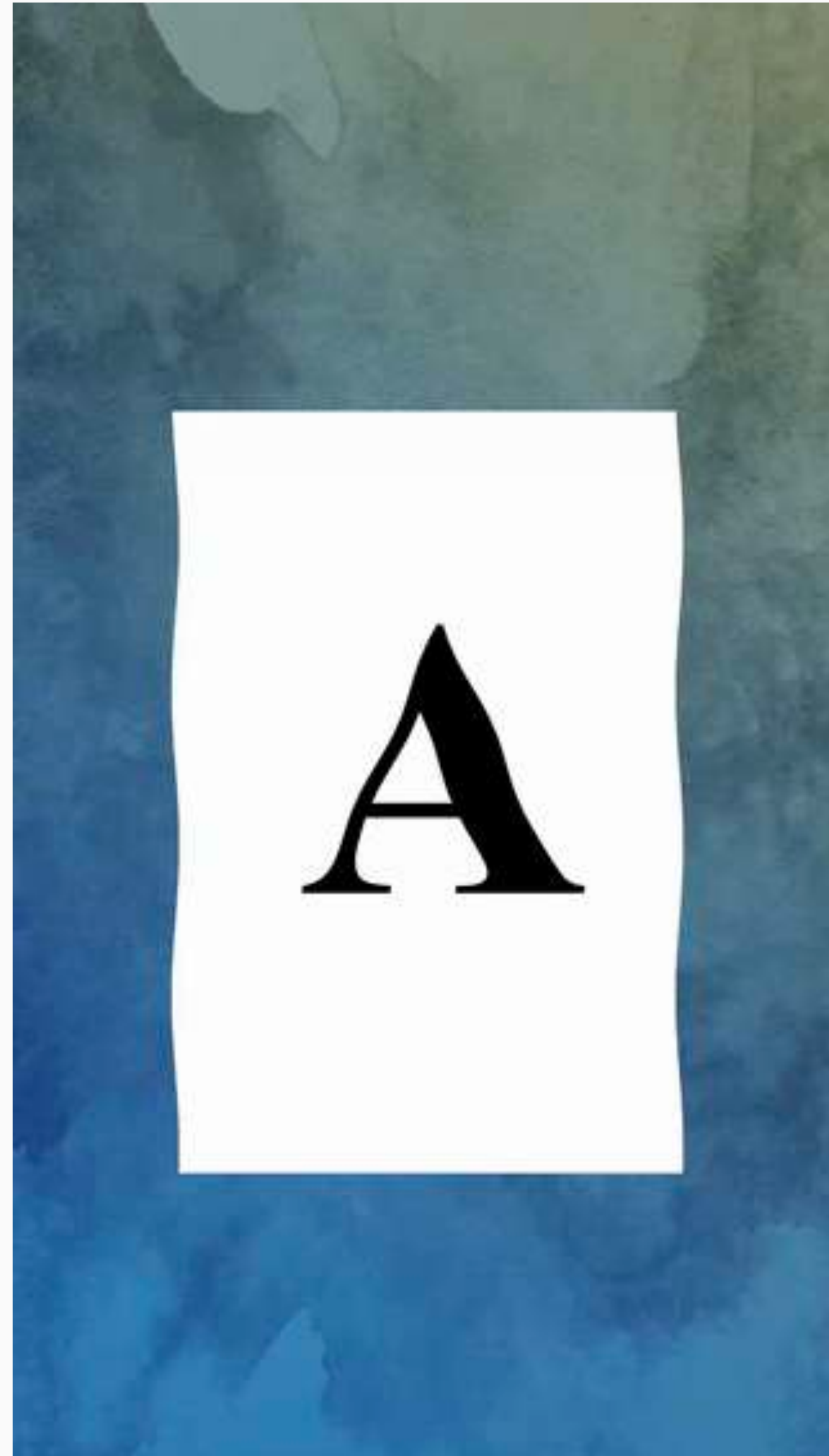
The whole interaction with the experimental setup takes place via a touch screen interface. The subject can navigate through the game and the tasks using the dialogue windows, buttons or images on the screen.

Finally, if the subject correctly performs the given task, he is allowed to proceed forward, while if the RVR system detects an error during the test or the practice trials, the system asks the child to re-perform the task.

If the child is stuck in the task, the system automatically calls the experimenter, who can come and resolve the situation.

Actually, the biggest challenge we faced

Motivating user to accomplish the task



My role in Crab

I mostly focused on the storytelling of the application. I created some animations, using Adobe After Effect, that were displayed in specific key-points of the user flow.

These animations were designed to motivate the users (children) to successfully accomplish the tasks.



You can see these
animations "alive" on my
online portfolio
gabrielecazzola.it

Personal interests

Entrepreneurship



Social
commitment



Videomaking

I play cello in a
rock band!



Digital tools I work with

Storytelling



Prototyping



Data analysis



Contacts

University mail

gabriele.cazzola@studenti.unitn.it

Personal mail

gabriele.spergolo@gmail.com

Mobile

+39 3802 3288 83

Linkedin

Gabriele Cazzola

Digital portfolio

www.gabrielecazzola.it