Tod. reading for the blind on their fingertips

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Abstract
The Tod. Project was created for an Interaction Design college subject. When we first started studying more about the Artificial Intelligence world, we found that there were a lot of negative aspects about it. As a group, we set out to follow a path that led to a positive and meaningful impact on society. Real help for real people. Our goal was to create a device that radiates simplicity and accessibility while establishing inclusion as our main goal, in order to provide the visually impaired something of real use and that could, in a way, change their lives. Tod. is born through the belief that technology and AI have more positive things to offer us as a society, especially in our daily lives, and that it should be put to use to help those who need it the most.

Keywords: Interaction Design, Artificial Intelligence (AI), Braille, Visual Impairment.

1. Artificial Intelligence research

With Artificial Intelligence as a motto to this project, we have to understand its meaning and the way it is used and implemented in our lives. Artificial Intelligence (AI) refers to the simulation of human intelligence in machines, the ability to rationalize like the human being and mimic their actions in whatever task is given to them. It's this kind of technology and the diverse fields of study and even issues around it, that is already being used and debated in most corporations, and some say it's the answer to the future.

As technology evolves and becomes more common, these AI devices immersed in our daily lives must also mature in order to better adapt themselves to meet our needs or maybe even surpass them. The goal is to incorporate smart objects in routines and make them as autonomous as possible, capable of observing and learning human behaviours so that eventually, they will be able to predict our future behaviours and adjust its services to our necessities and preferences. This involves Machine Learning.

Since AI is so unnoticeably available these days, it doesn't even cross our minds the considerable amount of tools, material or digital, that we own in which it is present. From smart personal assistants, such as Alexa or Echo, through online shopping, voice-to-text features, email assortment and organization to social networking in apps like Facebook or Instagram. The decisions we make and content we post contribute to the enrichment of AI knowledge, which consequently will be used to dictate the type of suggestions offered to us while interacting with these tools. This raises questions such as data surveillance, invasion of privacy and security, trust deficit or even bias related problems, which make some of the major flaws in Artificial Intelligence.

2. Conceptual Framework

2.1 Positive approach

The negative side is quite present in the way that AI plays us as a society and transforms us into "robots" at its service. The question regarding data privacy is also something

quite impactful for which we wanted to find a solution, as a group. Being conscious about it was the first step but we didn't want to end there. We sought to elevate the theme and find real solutions.

Trying to evaluate in which way we could find a positive side in AI, we realised that we'd have to focus on a greater goal. Something that would be inclusive and of real use for someone, a non-pervasive but necessary use. A tool, not a weapon. Following this line of thought, we came up with ideas of what would be the project and in which target audience it would have the most
positive impact.

2.2 Visual Impairment research

Visual impairment can be defined as a decreased ability to see to a degree that can't be fixed by usual means, such as glasses. This condition varies from mild vision loss, to total blindness and can occur due to injury, disease or genetic conditions. Despite generally affecting a person's ability to read, it's sense of orientation and awareness of its surroundings, visual impairment can lead to difficulties in communication and language development, which in an increasingly visual world, can lead to a huge gap in the access of information.

2.3 Daily struggles of the visually impaired

In developing a product destined to be used by visually impaired people, first comes the need to understand the way they perceive the world, their daily struggles and limitations, how they perform the most mundane activities and the important role of the other 4 senses of the human being. This implies an intensive research on solutions and systems used in already existing devices for visually impaired people, in what ways they are useful and practical to them and why.

3.2 Contacting ACAPO

For an even more accurate answer to these questions, we got in touch with ACAPO, the portuguese association of blind and amblyopic people, where we received the testimony of the community itself and their personal perspective on the daily struggles of a blind person, a crucial part in the process of designing and inclusive device.

3. Tod. Project

3.1. Foundation and Problem statement

Focusing on one of these daily struggles, the project addresses the lack of access to written information by visually impaired people. To do so, it takes hold of braille, the universal alphabetic writing system for this community, that uses raised dots to represent the letters of the alphabet.

Looking around, we are constantly presented with written information, whether it be in street signs, product labels, or the more obvious, books. Visually impaired people are deprived from all this information, and although there are certain books and products (mainly medicines) that contain braille translation, these are very few compared to what this community does not have access to.

3.2. Concept and advantages

The following project comes to solve this problem through the help of Artificial Intelligence. It consists of a device that uses AI to automatically translate text and characters into braille. The device, that goes by the name of Tod. originated from the word "dot" as the fundamental unit of the braille system, will work as an auxiliary gadget/mechanism for its user, allowing him to read all sorts of written information, such as product labels in supermarkets, menus and schedules, street signs and posters, books, etc.

The goal is to allow visually impaired people to access more of what other people can read, in an effort to help them become more independent and involved in society.

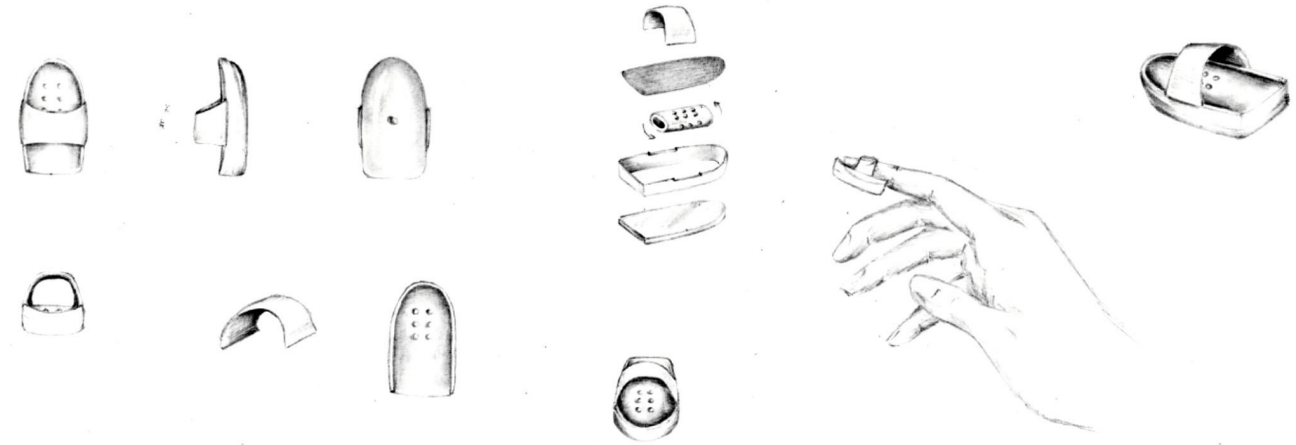
4. UX Design

4.1 Personas

To better understand how this device would work and the different scenarios of its usage, we created three personas with different backgrounds and characteristics in which the experience of using Tod. would have a specific role and impact on their lives.

4.2 Tod. Design

Taking in account the fact that visually impaired people don't navigate the world the same way as we do, our device needed to be designed in order for this community to use it easily. As such, we had to create a device that was simple and intuitive.



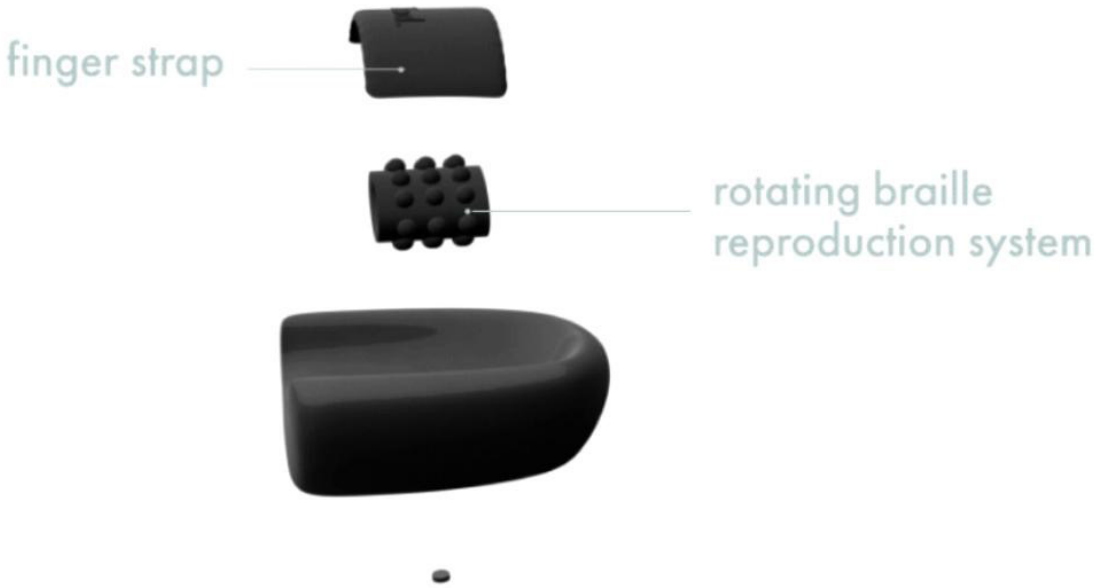
First sketches

3D prototype

4.3 Functionality

Our device is made up of a simple system. A scanner reads and analyses the text through contrast. The collected information is then transmitted to a rotating braille reproduction system that slides the braille correspondent to the text under the user's finger, mimicking the natural braille reading movement. The user can simply put the device on its finger and Tod. will automatically vibrate to inform it's been turned on. If the battery starts running out, Tod. will vibrate three times to let the user know it needs to be charged.

Tod. was designed to be comfortable and very intuitive and even the charger was made to fit the target audience needs: it's wireless so, as long as the charger is plugged in, the user can simply put the Tod. on top of the charger, and doesn't need to worry about connecting anything to the device.



Device parts and functionality

4.4. First sketch and Blender prototype

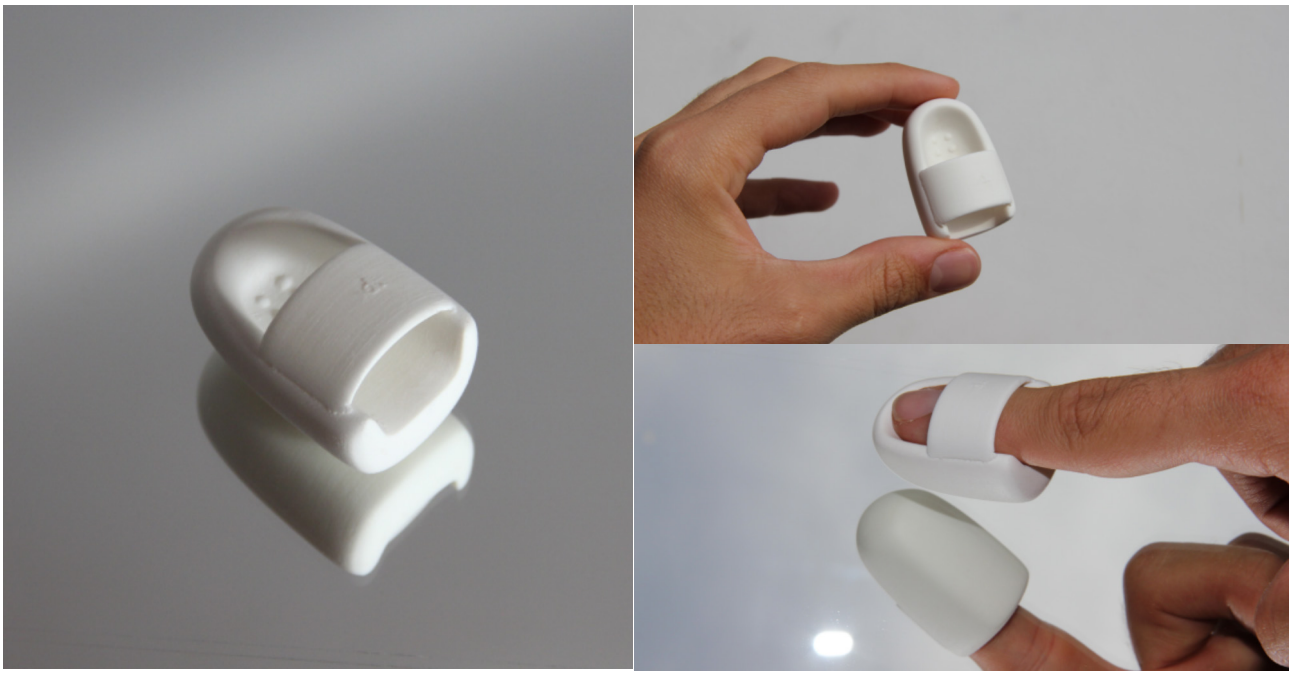
In order to visualize our idea better, after sketching out the idea, we designed Tod. on a 3D software. We decided it would be available in both black and white and even animated Tod. in order to see what it would look like while it's being used.

4.5 Website, teaser and packaging

The website was born from the need to publicize Tod. Given our target audience and their needs, we created an audio button that works as a translator to the website content.

The home page contains a virtual tour of the device that explains, through animations, what it is, how it works and its functionality. There's also some shots of the 3D printed model and teaser video. The 'Get your Tod.' page allows you to buy Tod. and select your preferences such as the colour and the option to add a charger, (in case the user already has one and doesn't feel the need to buy another).

The packaging is also available for preview in this tab and, once again, it was designed to be as intuitive as possible. Instructions are placed on the packaging, in braille, making it one single object with no loose pieces that could be potentially easy to lose.



Real scale 3D printed model

Tod's package

Frames from the teaser

If the user wants to know more about the project itself, there's also a tab created for that, the 'About page'. In an attempt to create a sense of connection with the target audience we explained our project's concept and presented our initial sketches for Tod.'s design.

The Tod Project can be consulted at: https://todproject.weebly.com

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